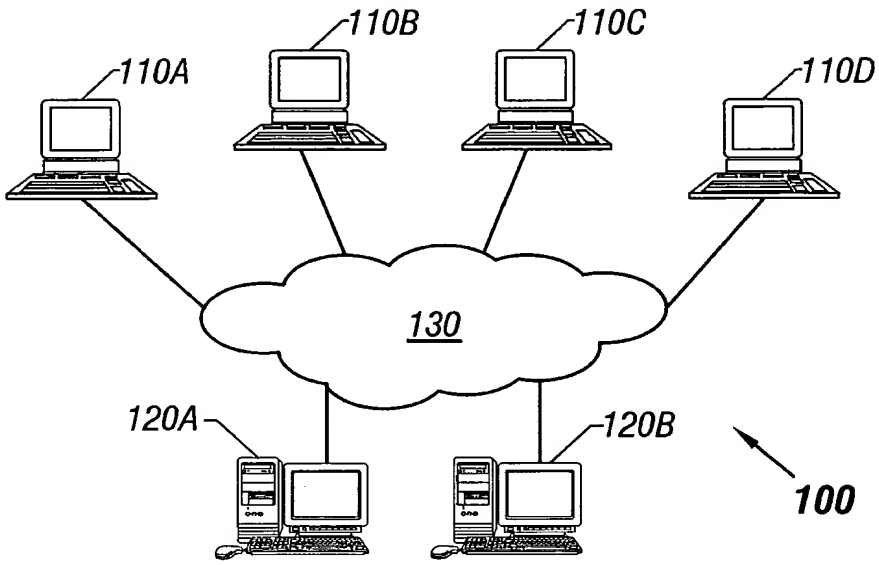


FIG. 1A
(Prior Art)

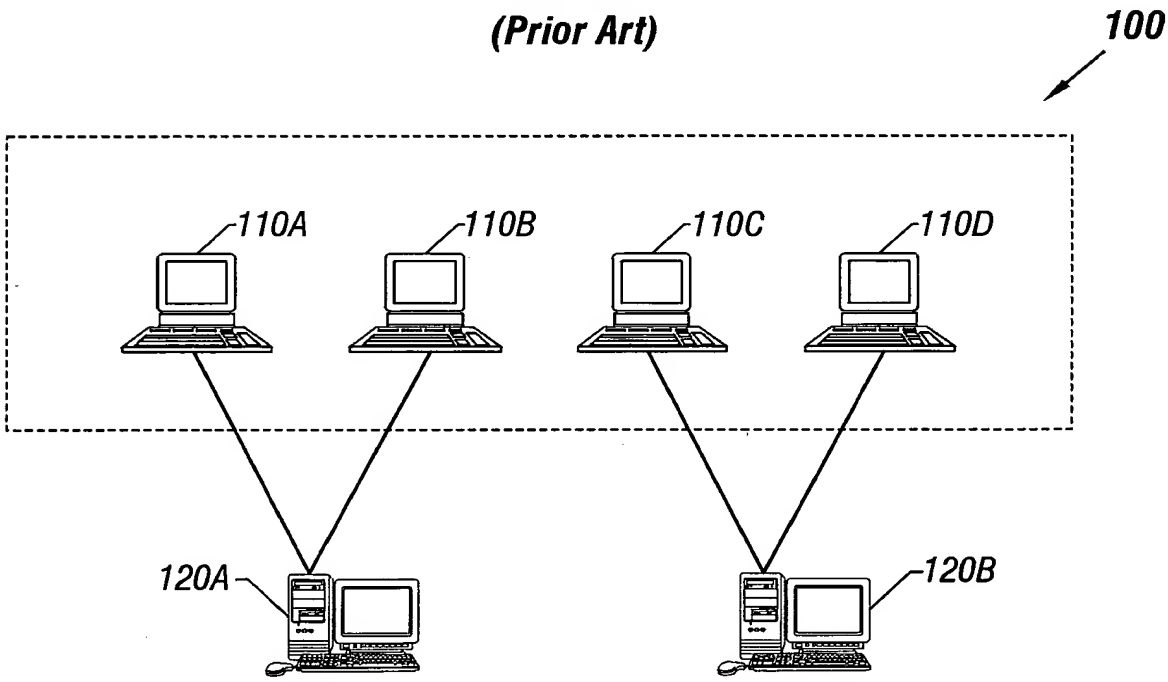


FIG. 1B
(Prior Art)

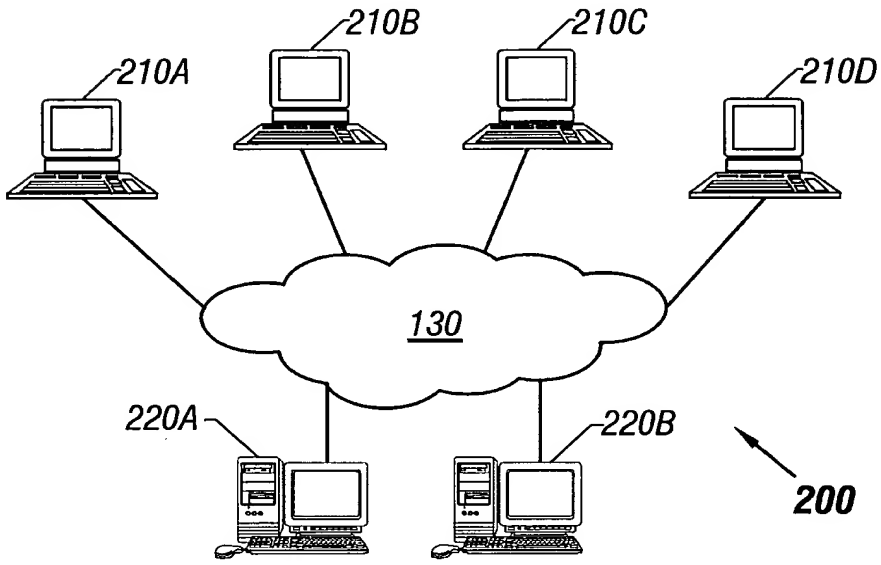

210A
210B
210C
210D
130
220A
220B
200

FIG. 2A

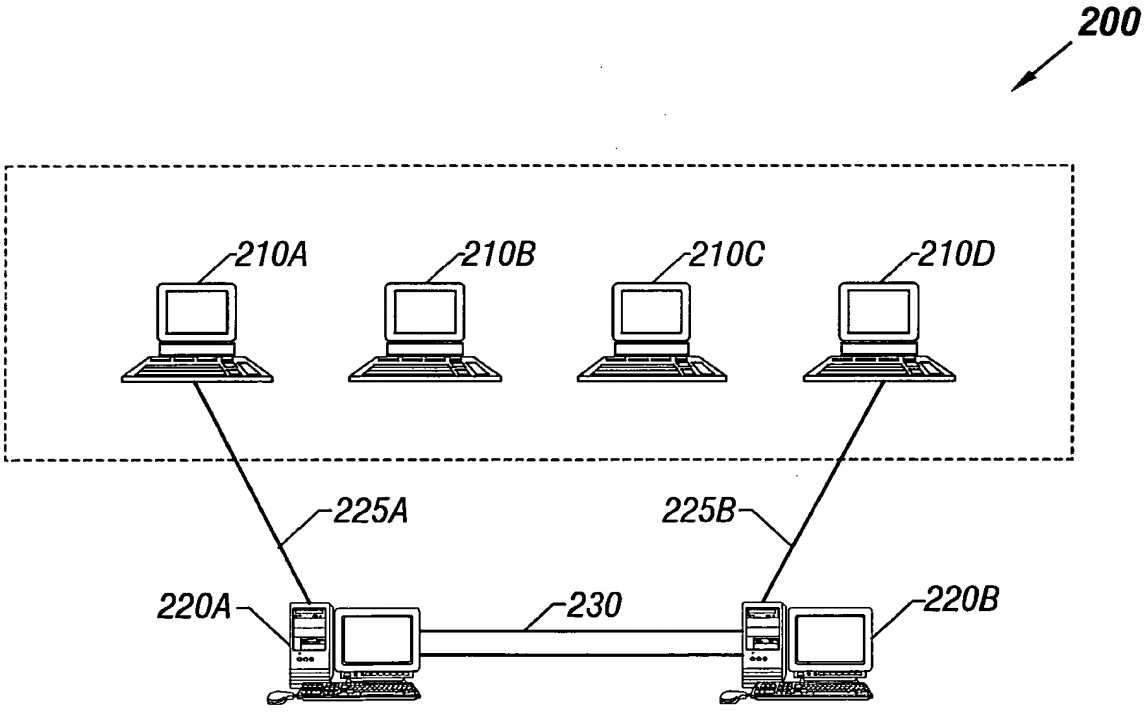
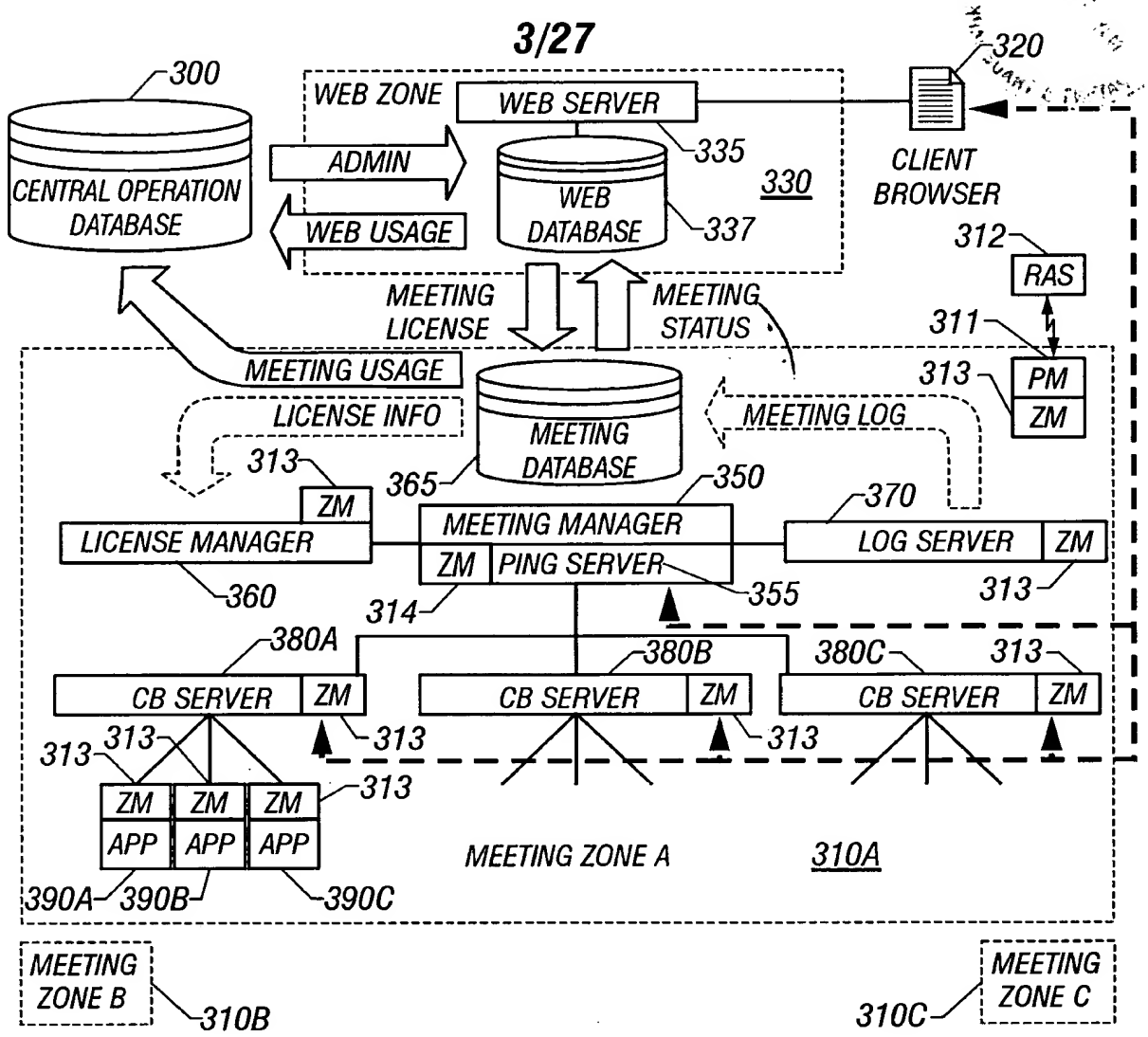

200
210A
210B
210C
210D
225A
225B
220A
230
220B

FIG. 2B


300
CENTRAL OPERATION DATABASE
WEB ZONE
WEB SERVER
335
ADMIN
WEB USAGE
WEB DATABASE
337
330
320
CLIENT BROWSER
312
RAS
311
313
PM
ZM
MEETING LICENSE
MEETING STATUS
MEETING USAGE
LICENSE INFO
MEETING DATABASE
365
MEETING LOG
313
ZM
LICENSE MANAGER
360
MEETING MANAGER
ZM
PING SERVER
355
350
370
LOG SERVER
ZM
313
314
380A
380B
380C
313
CB SERVER
ZM
CB SERVER
ZM
CB SERVER
ZM
313
313
313
313
ZM
ZM
ZM
APP
APP
APP
390A
390B
390C
MEETING ZONE A
310A
MEETING ZONE B
310B
310C
MEETING ZONE C

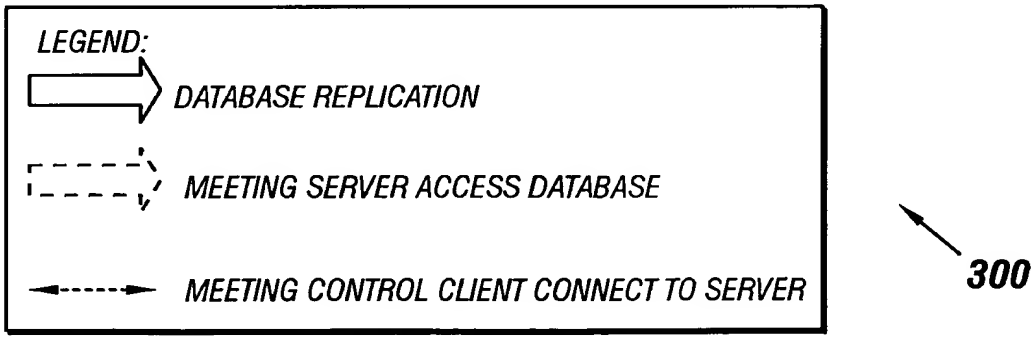

LEGEND:
DATABASE REPLICATION
MEETING SERVER ACCESS DATABASE
MEETING CONTROL CLIENT CONNECT TO SERVER
300

FIG. 3

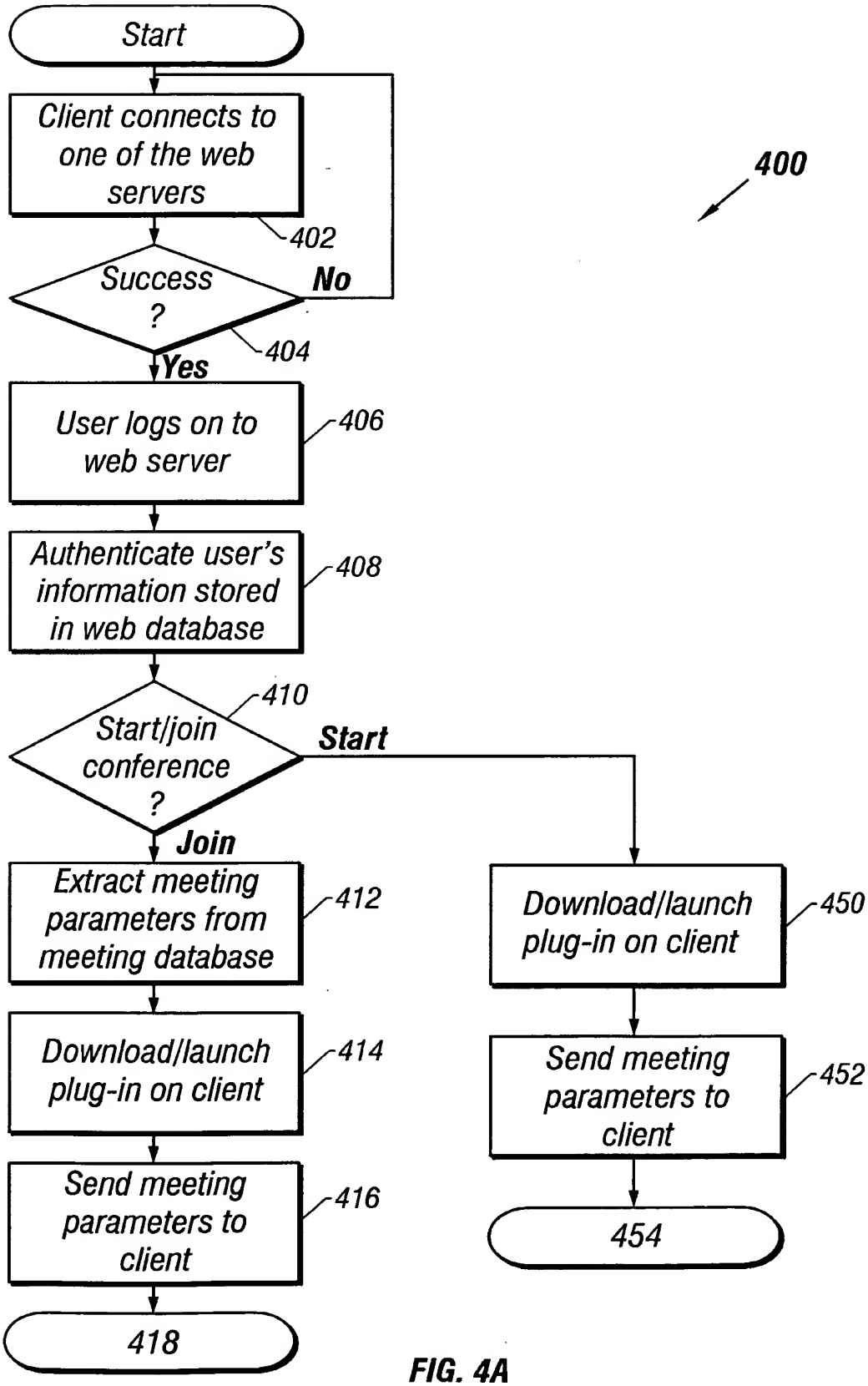

Start
Client connects to one of the web servers
402
Success ?
No
404
Yes
User logs on to web server
406
Authenticate user's information stored in web database
408
Start/join conference ?
410
Start
Join
Extract meeting parameters from meeting database
412
Download/launch plug-in on client
414
Send meeting parameters to client
416
418
Download/launch plug-in on client
450
Send meeting parameters to client
452
454
400

FIG. 4A

400

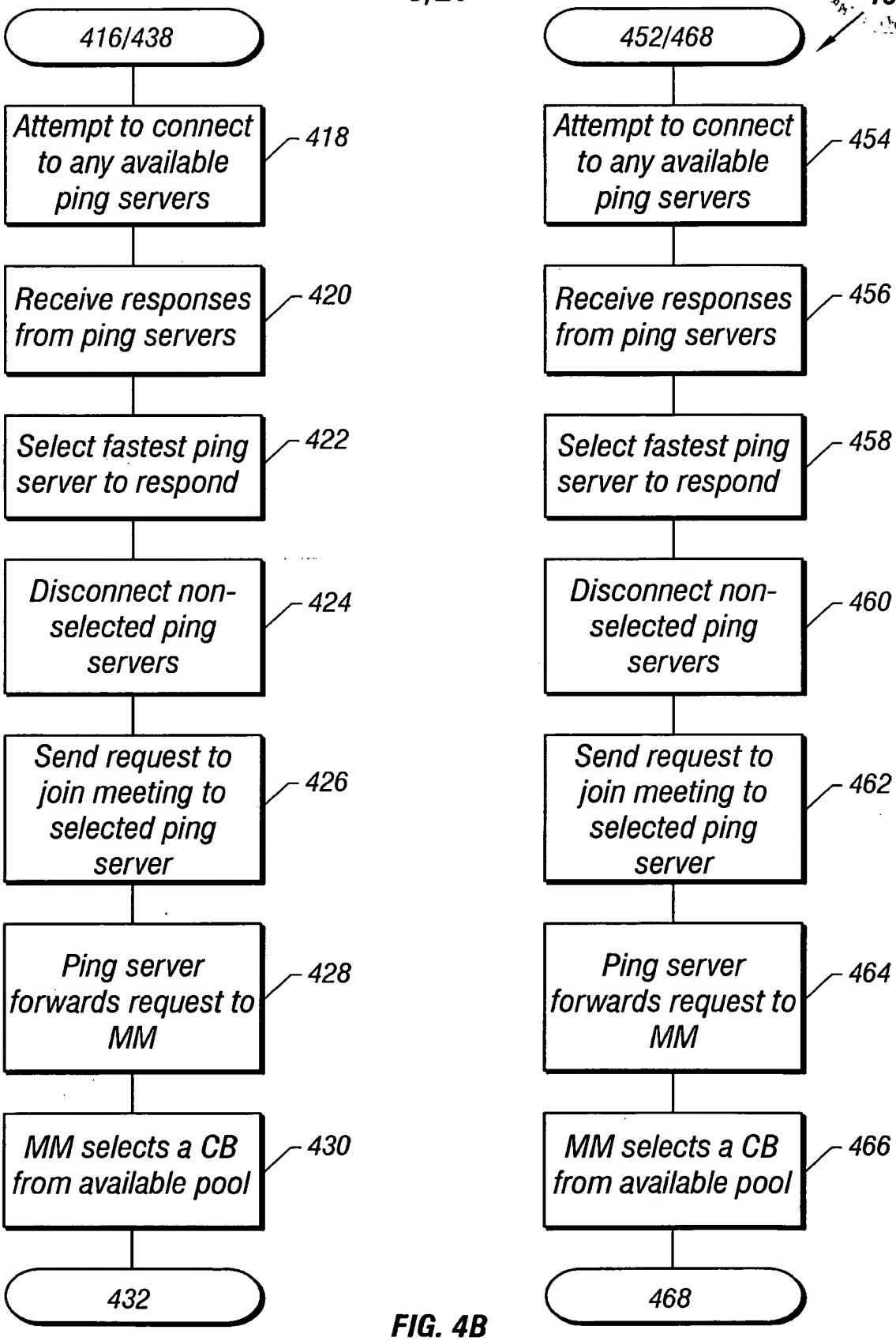

416/438
Attempt to connect to any available ping servers
418
Receive responses from ping servers
420
Select fastest ping server to respond
422
Disconnect non-selected ping servers
424
Send request to join meeting to selected ping server
426
Ping server forwards request to MM
428
MM selects a CB from available pool
430
432
452/468
Attempt to connect to any available ping servers
454
Receive responses from ping servers
456
Select fastest ping server to respond
458
Disconnect non-selected ping servers
460
Send request to join meeting to selected ping server
462
Ping server forwards request to MM
464
MM selects a CB from available pool
466
468

FIG. 4B

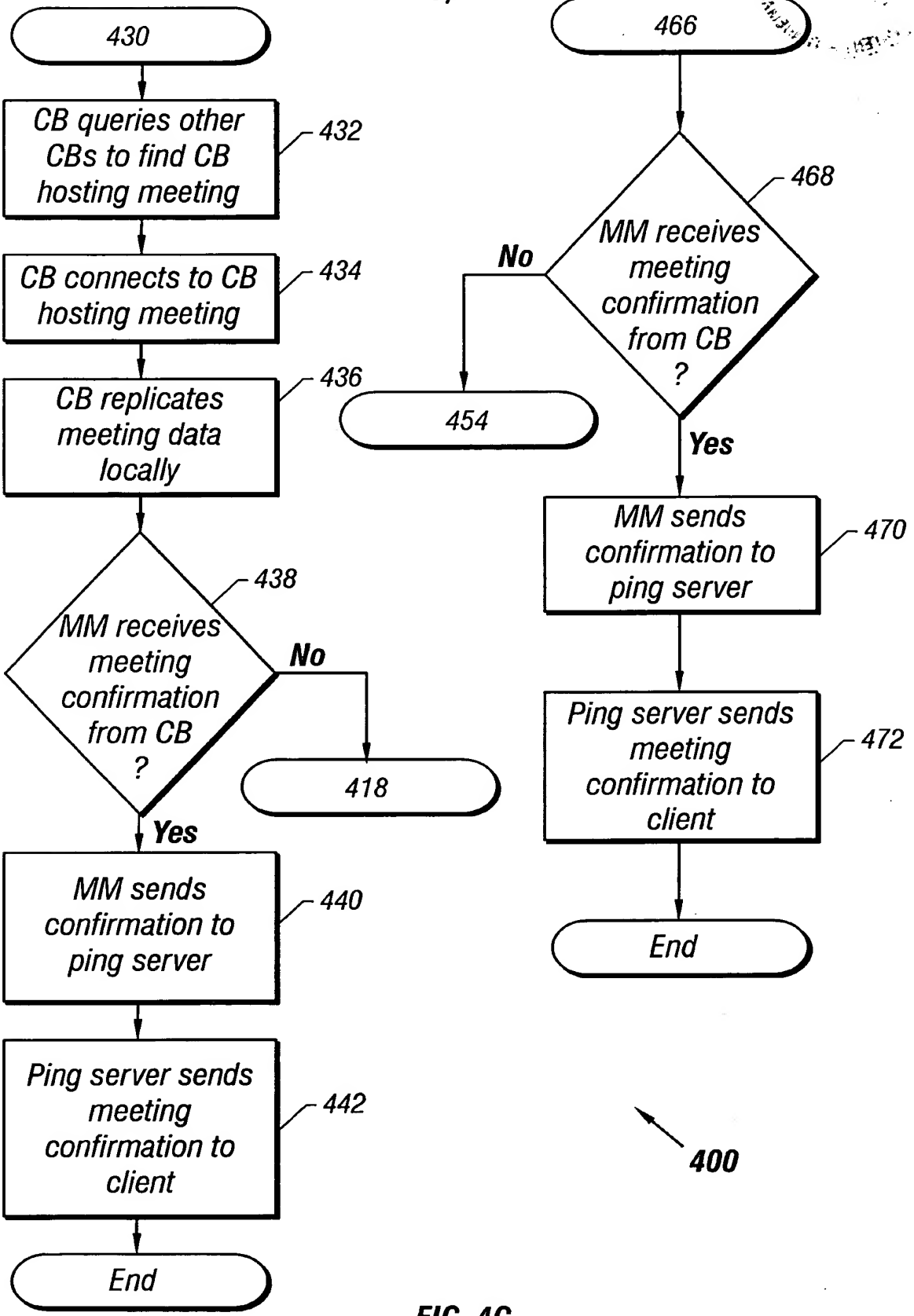

430
CB queries other CBs to find CB hosting meeting
432
CB connects to CB hosting meeting
434
CB replicates meeting data locally
436
MM receives meeting confirmation from CB ?
438
No
418
Yes
MM sends confirmation to ping server
440
Ping server sends meeting confirmation to client
442
End
466
MM receives meeting confirmation from CB ?
468
No
454
Yes
MM sends confirmation to ping server
470
Ping server sends meeting confirmation to client
472
End
400

FIG. 4C

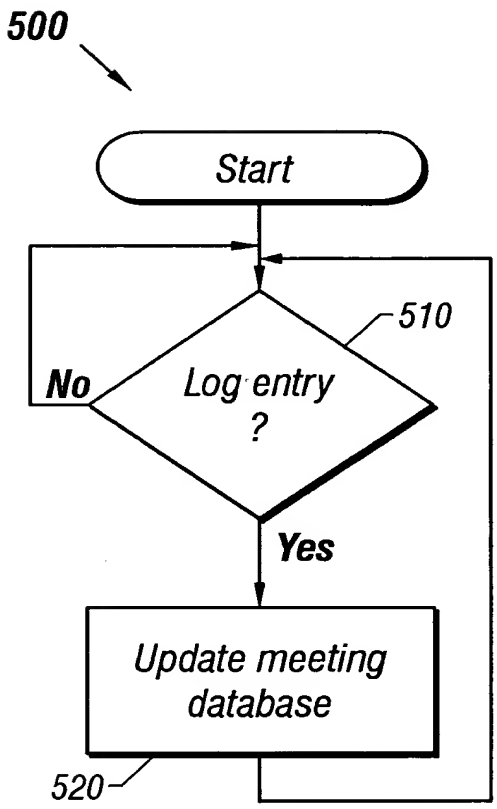

500
Start
510
Log entry ?
No
Yes
Update meeting database
520

FIG. 5

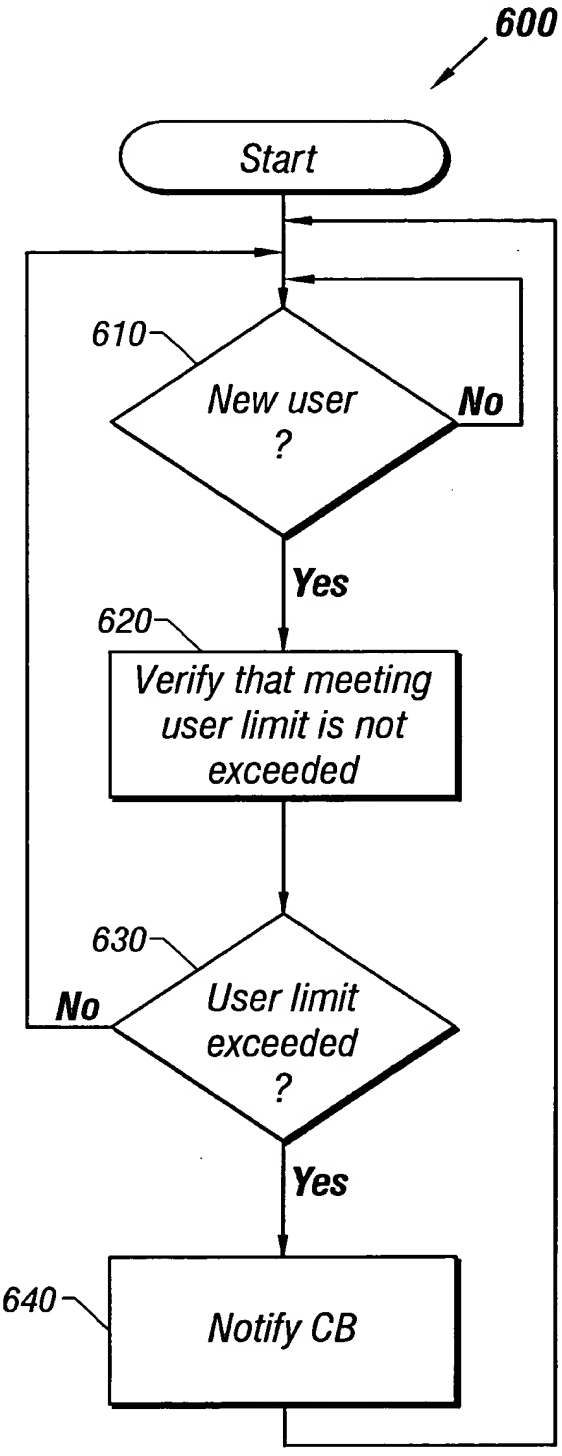

600
Start
610
New user ?
No
Yes
620
Verify that meeting user limit is not exceeded
630
User limit exceeded ?
No
Yes
640
Notify CB

FIG. 6

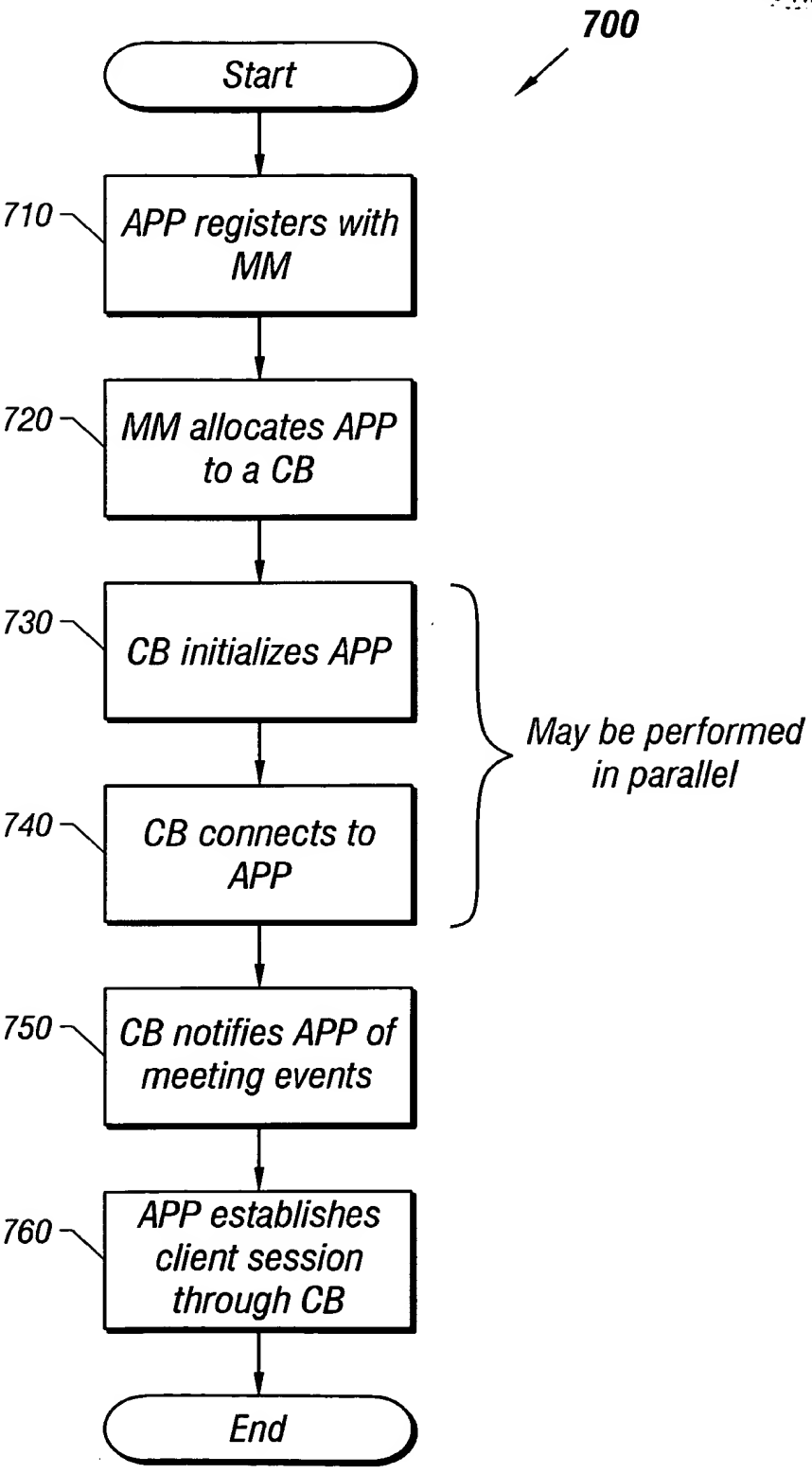

700
Start
710
APP registers with MM
720
MM allocates APP to a CB
730
CB initializes APP
740
CB connects to APP
May be performed in parallel
750
CB notifies APP of meeting events
760
APP establishes client session through CB
End

FIG. 7

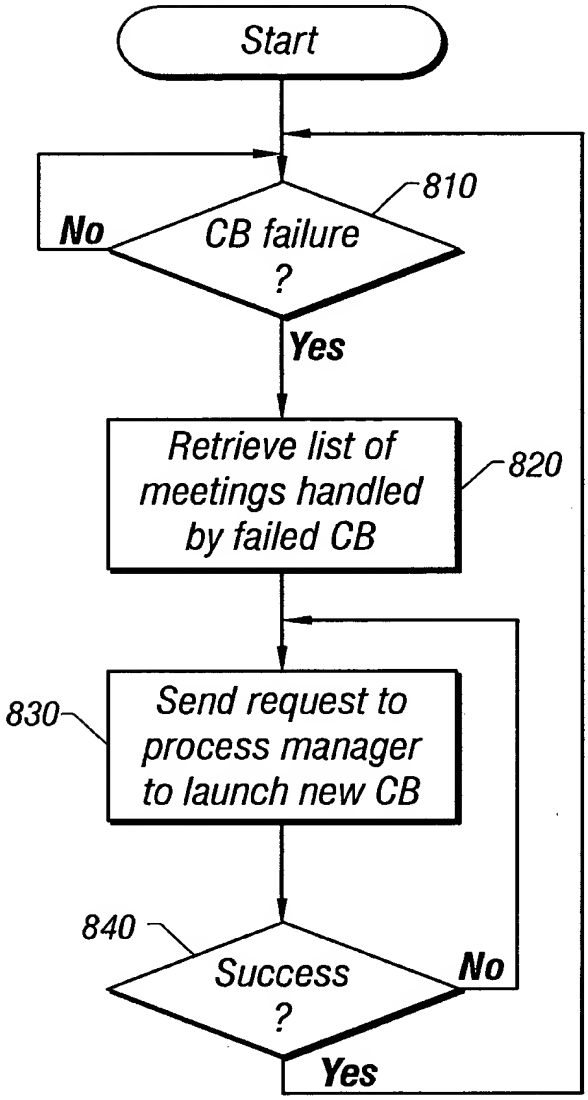
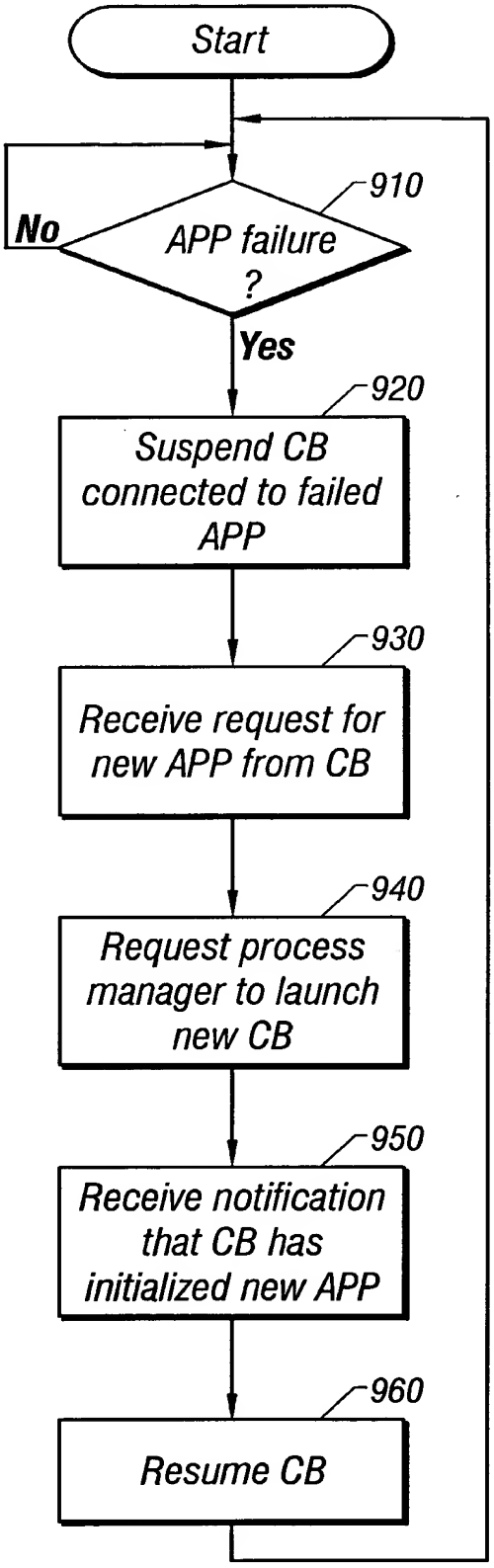


FIG. 8

800



900

FIG. 9

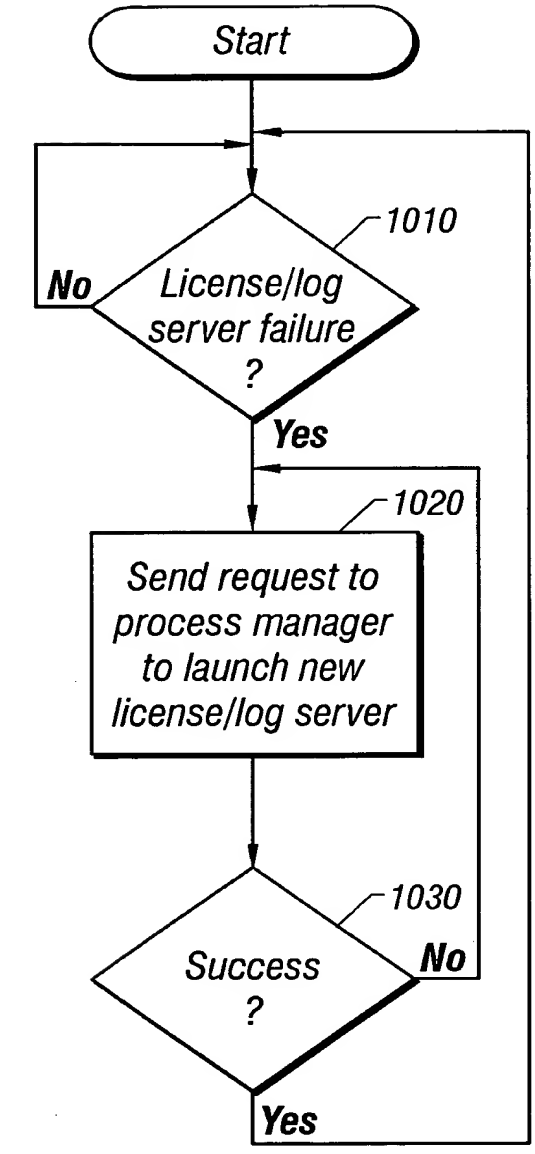

Start
1010
No
License/log server failure ?
Yes
1020
Send request to process manager to launch new license/log server
1030
Success ?
No
Yes
1000

FIG. 10

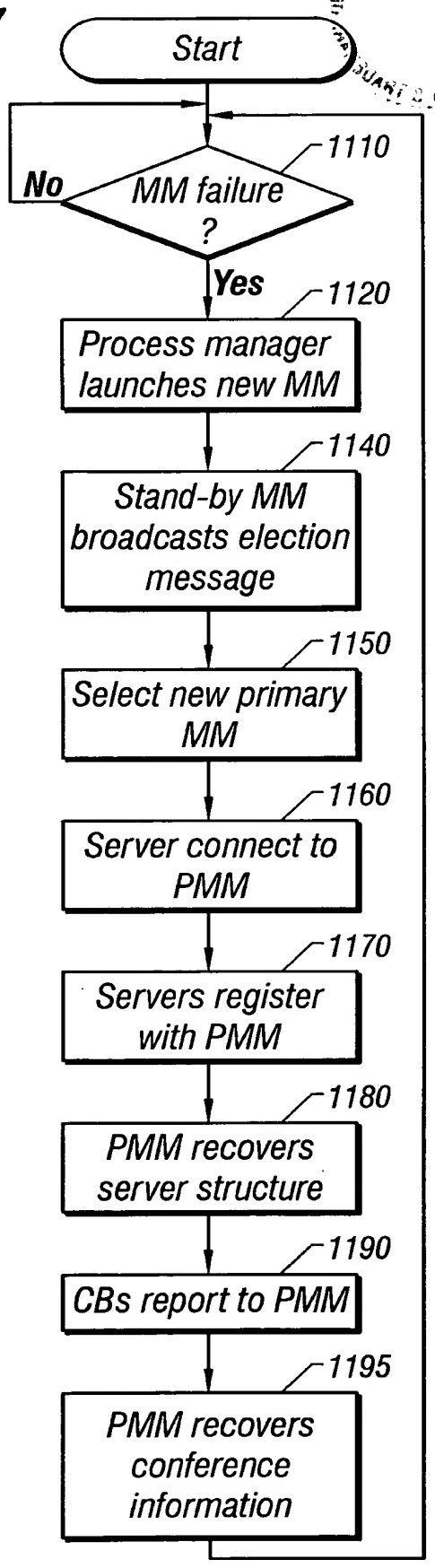

Start
1110
No
MM failure ?
Yes
1120
Process manager launches new MM
1140
Stand-by MM broadcasts election message
1150
Select new primary MM
1160
Server connect to PMM
1170
Servers register with PMM
1180
PMM recovers server structure
1190
CBs report to PMM
1195
PMM recovers conference information
1100

FIG. 11

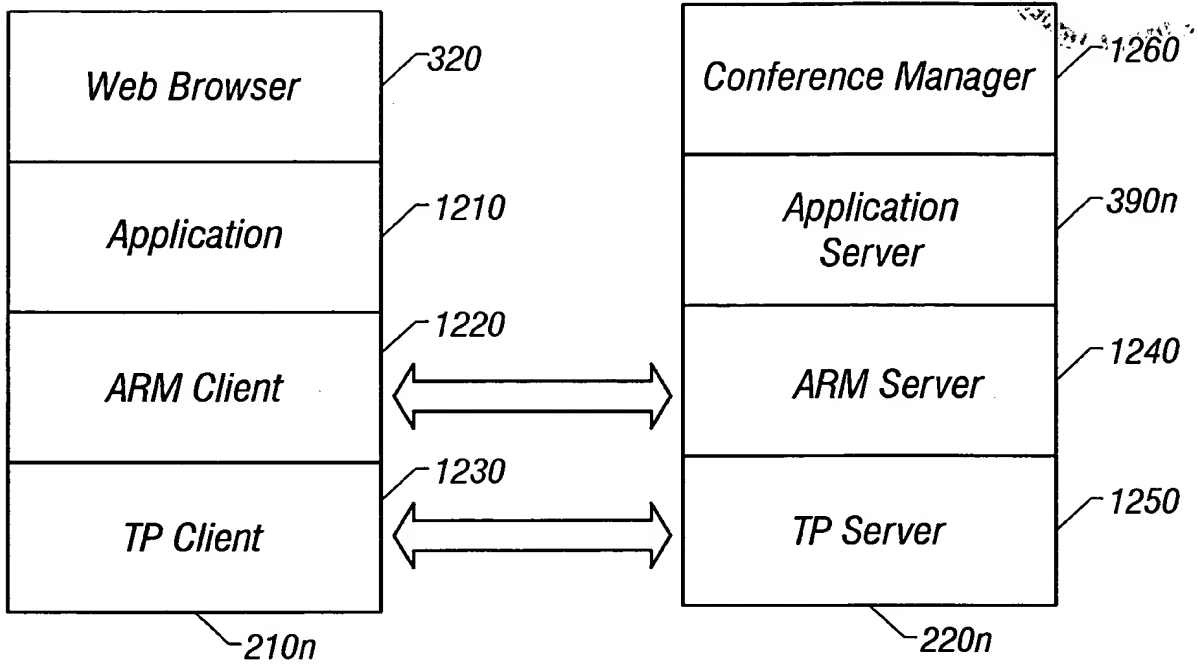


FIG. 12

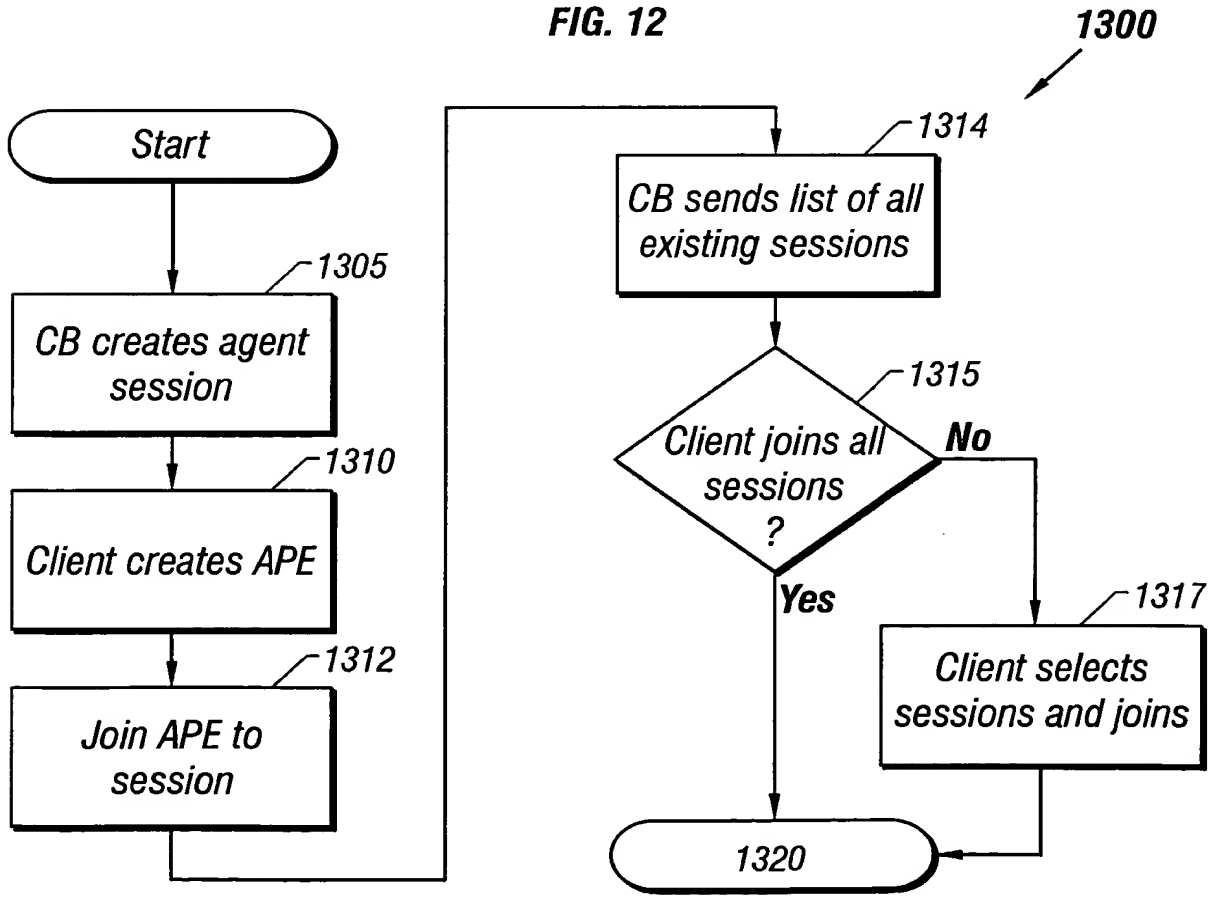


FIG. 13A

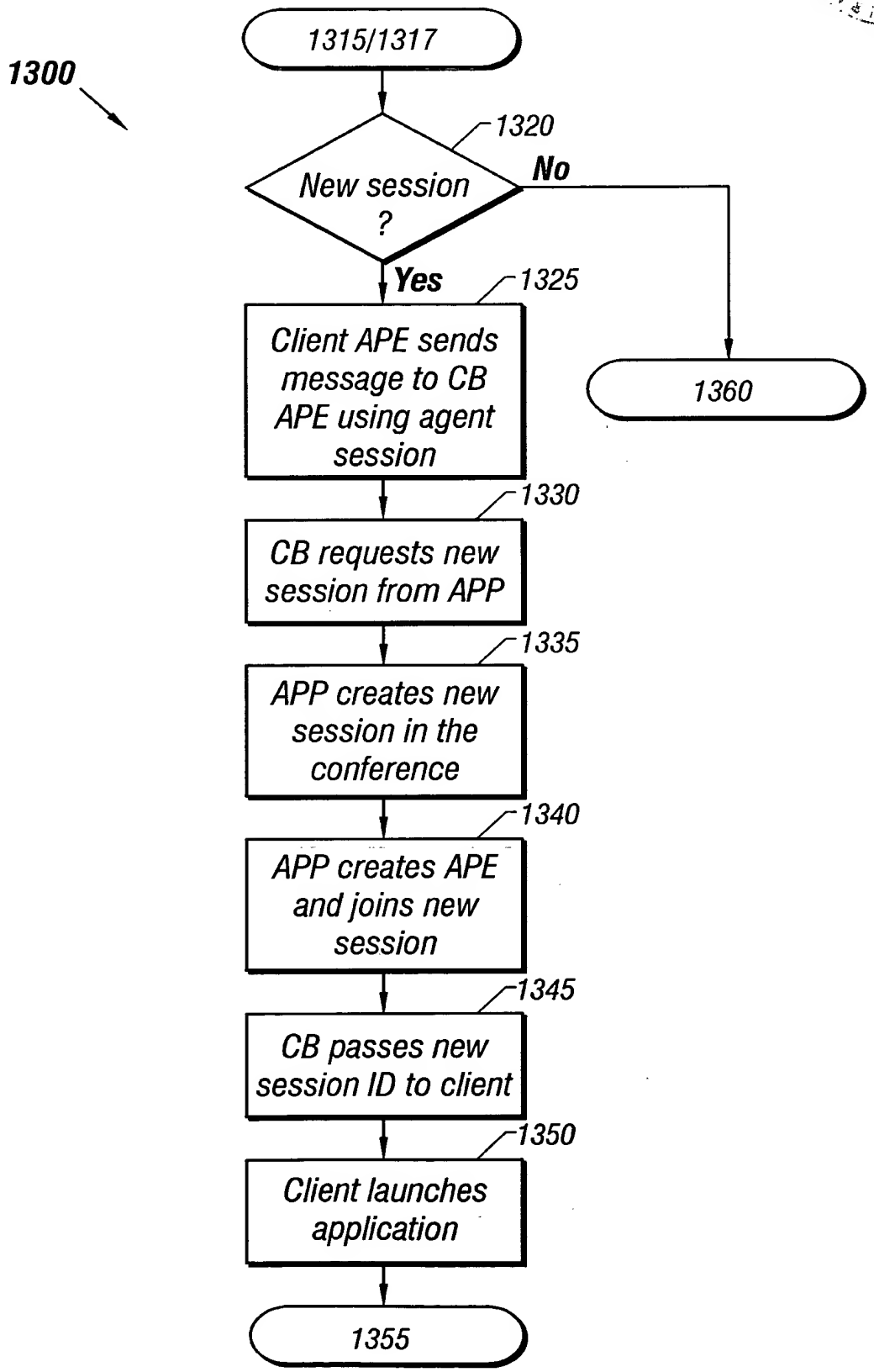

1300
1315/1317
1320
New session ?
No
Yes
1325
Client APE sends message to CB APE using agent session
1360
1330
CB requests new session from APP
1335
APP creates new session in the conference
1340
APP creates APE and joins new session
1345
CB passes new session ID to client
1350
Client launches application
1355

FIG. 13B

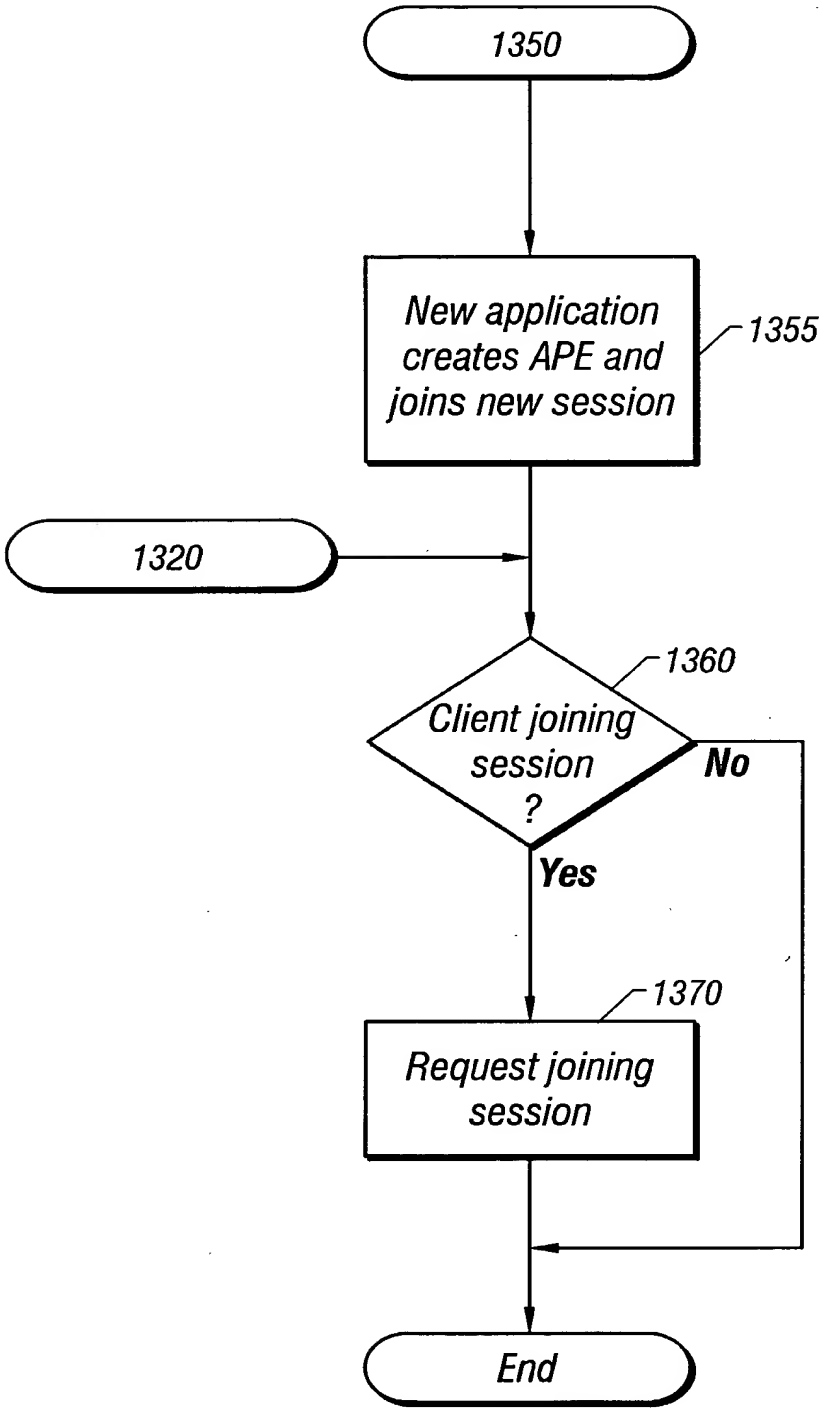

1350
New application creates APE and joins new session
1355
1320
1360
Client joining session ?
No
Yes
1370
Request joining session
End

FIG. 13C

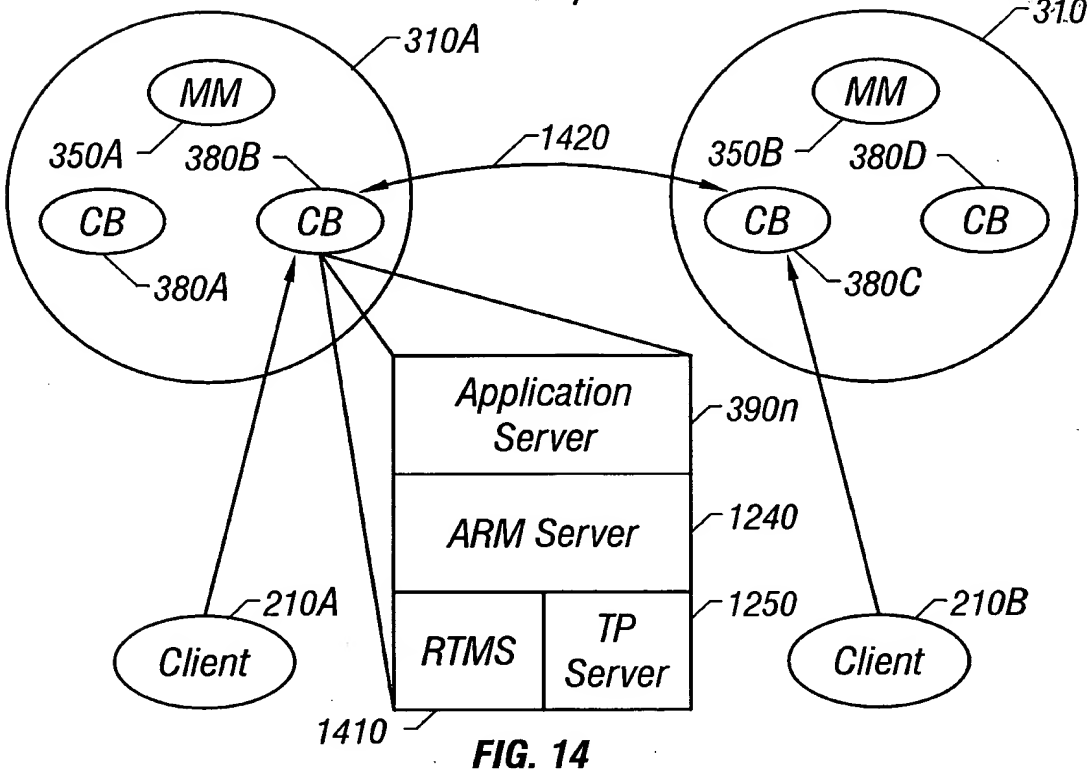

310A
310B
MM
MM
350A
380B
1420
350B
380D
CB
CB
CB
CB
380A
380C
Application Server
390n
ARM Server
1240
RTMS
TP Server
1250
210A
210B
Client
Client
1410

FIG. 14

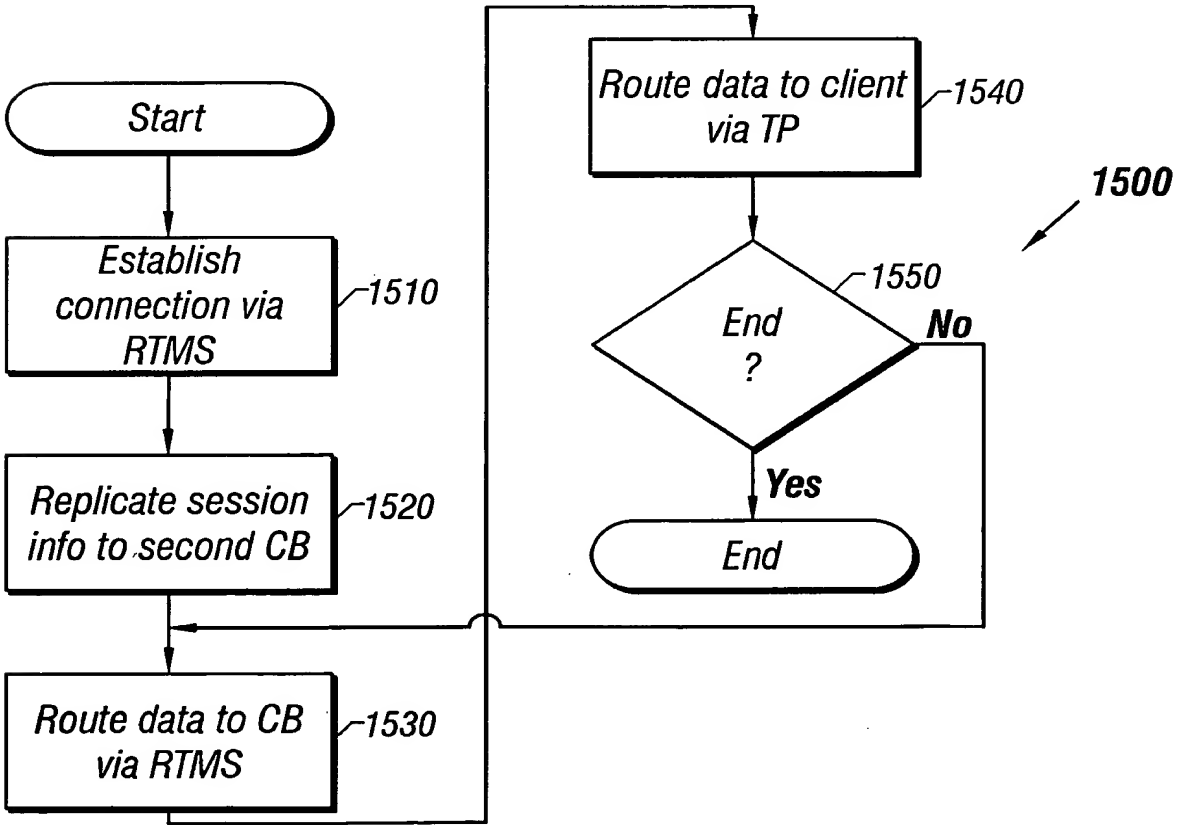

Start
Establish connection via RTMS
1510
Replicate session info to second CB
1520
Route data to CB via RTMS
1530
Route data to client via TP
1540
1500
End ?
1550
No
Yes
End

FIG. 15

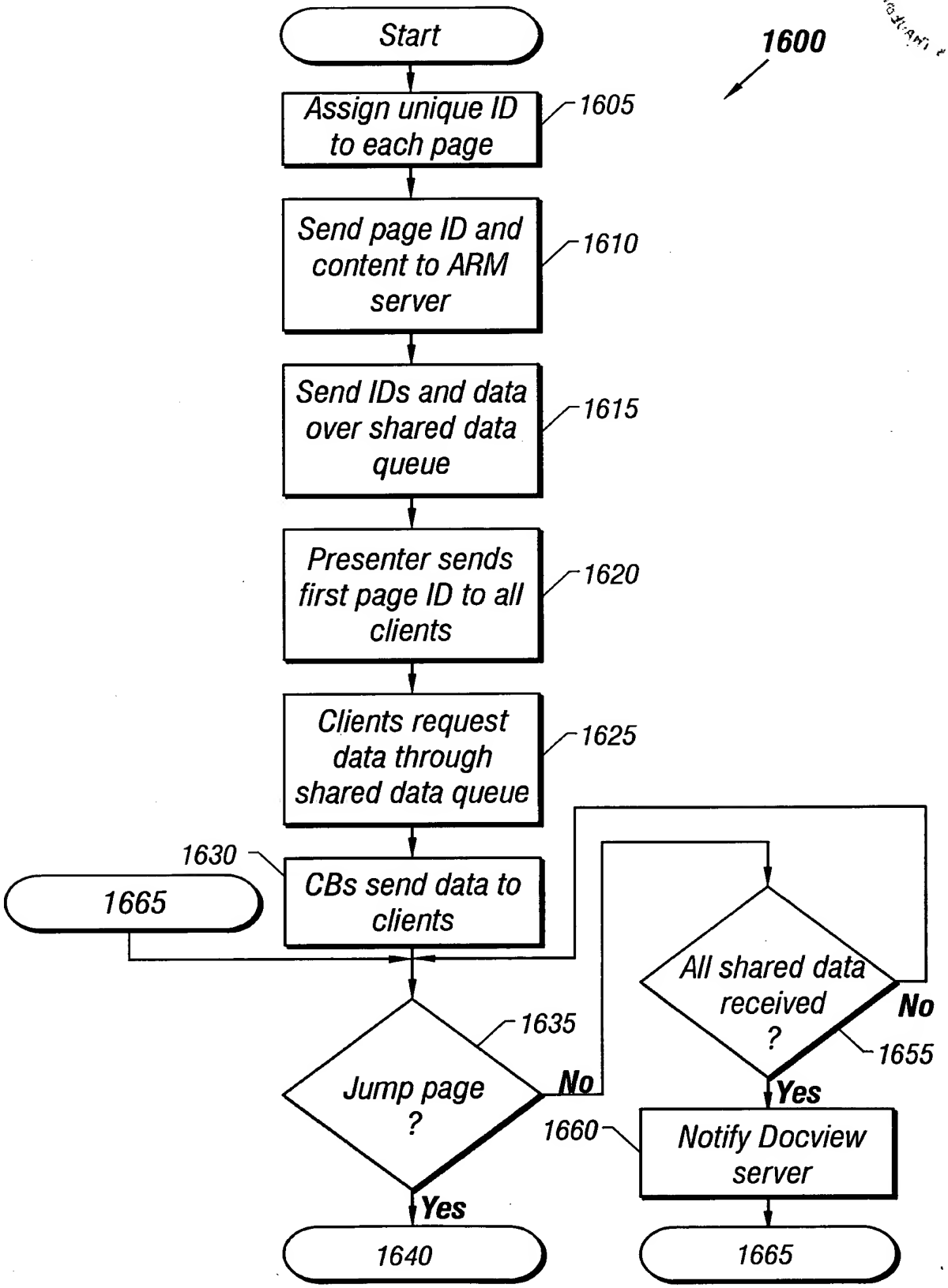

Start
1600
Assign unique ID to each page
1605
Send page ID and content to ARM server
1610
Send IDs and data over shared data queue
1615
Presenter sends first page ID to all clients
1620
Clients request data through shared data queue
1625
1630
1665
CBs send data to clients
All shared data received ?
No
1655
Yes
1635
Jump page ?
No
1660
Notify Docview server
Yes
1640
1665

FIG. 16A

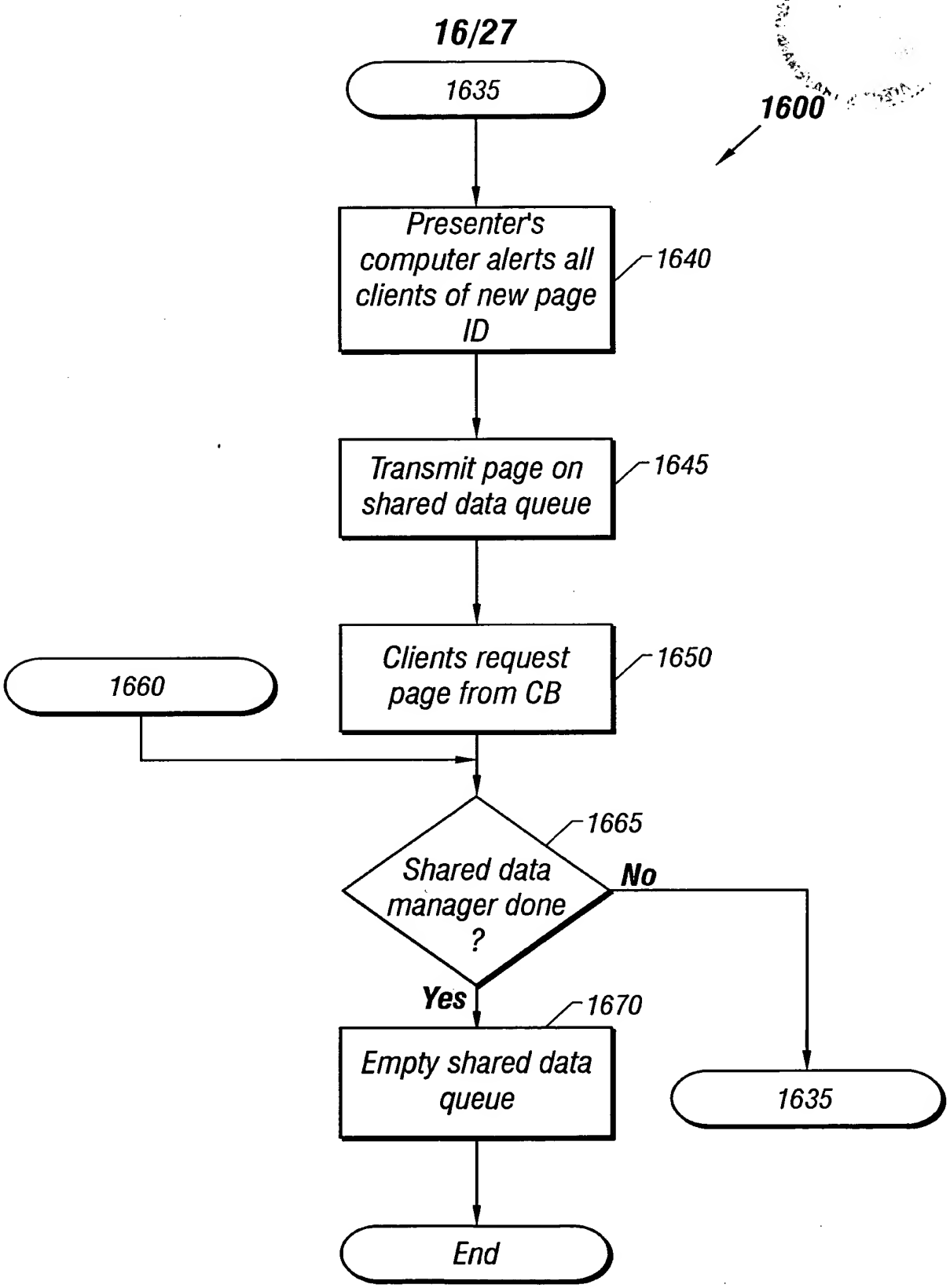

1635
1600
Presenter's computer alerts all clients of new page ID
1640
Transmit page on shared data queue
1645
Clients request page from CB
1650
1660
1665
Shared data manager done ?
No
Yes
1670
Empty shared data queue
1635
End

FIG. 16B

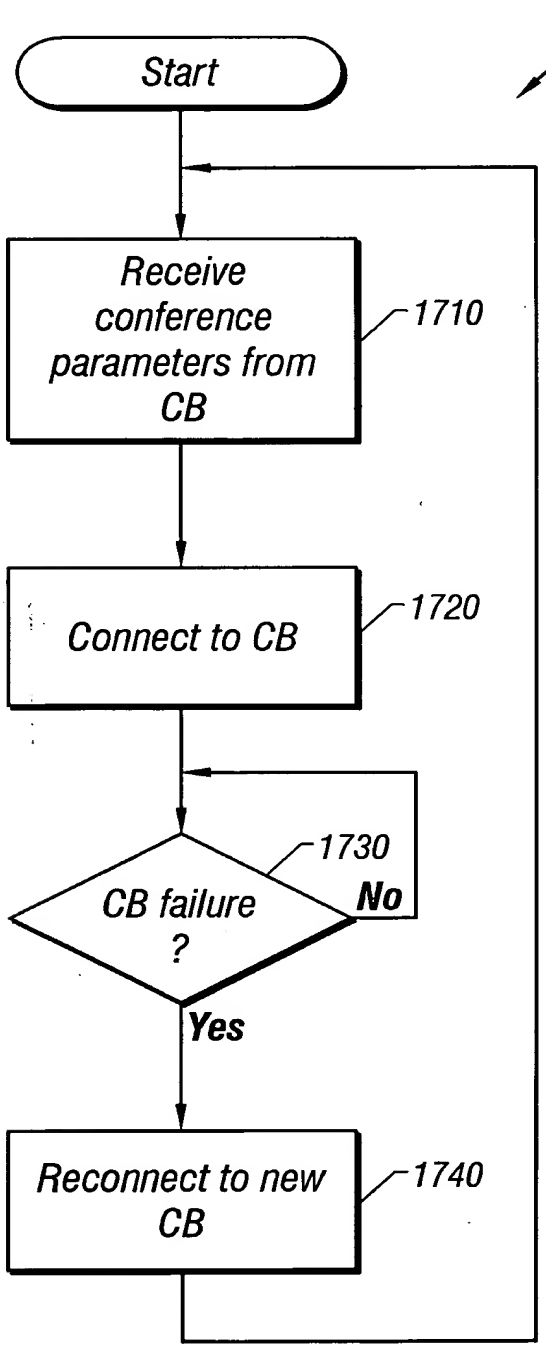

1700
Start
Receive conference parameters from CB
1710
Connect to CB
1720
CB failure ?
1730
No
Yes
Reconnect to new CB
1740

FIG. 17

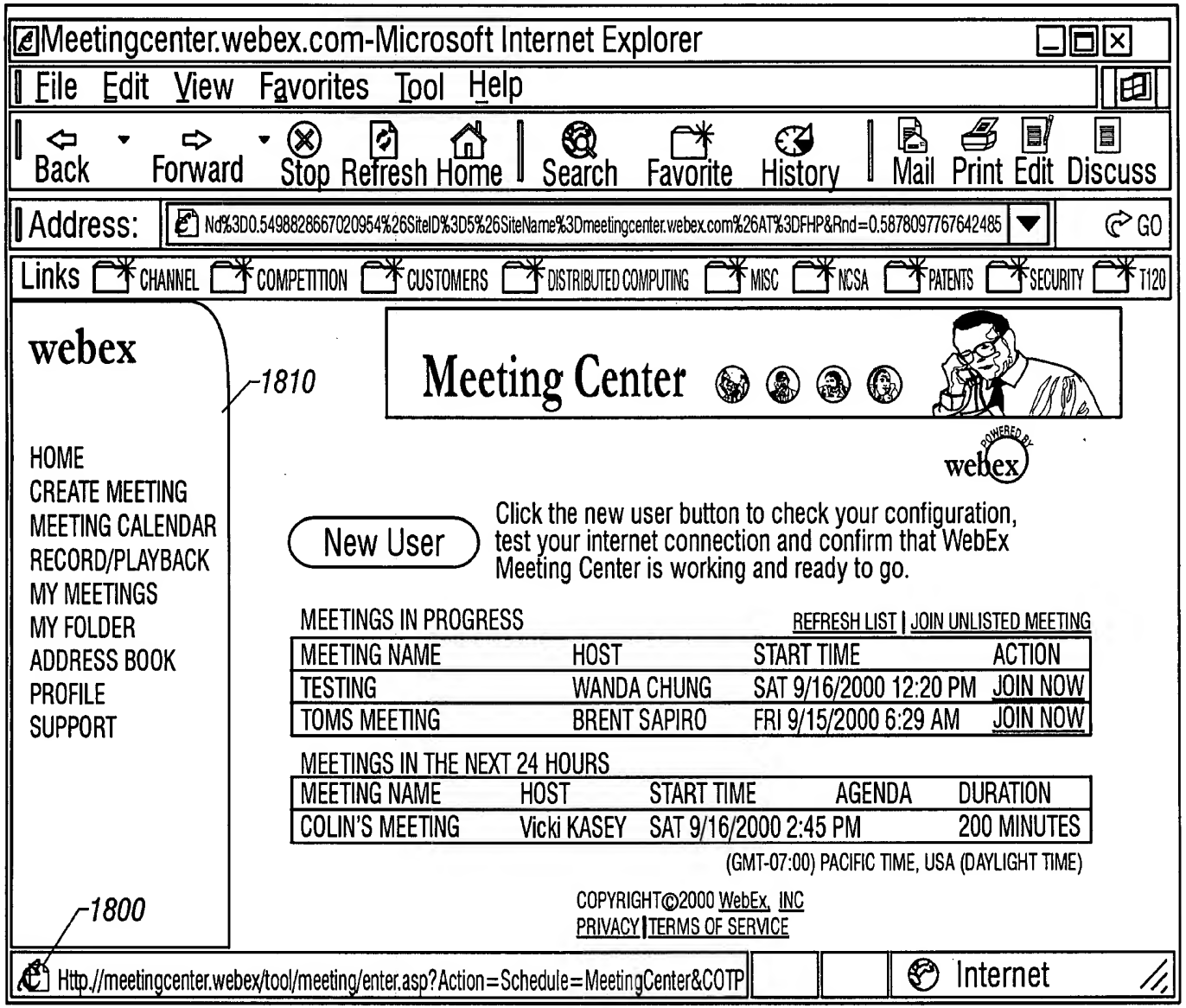


FIG. 18A

Title of Invention: Fault-Tolerant Server Architecture For Collaborative Computing
Attorney Docket No.: M-8858 US Inventors: Min Zhu,
Serial No. 09/752,376

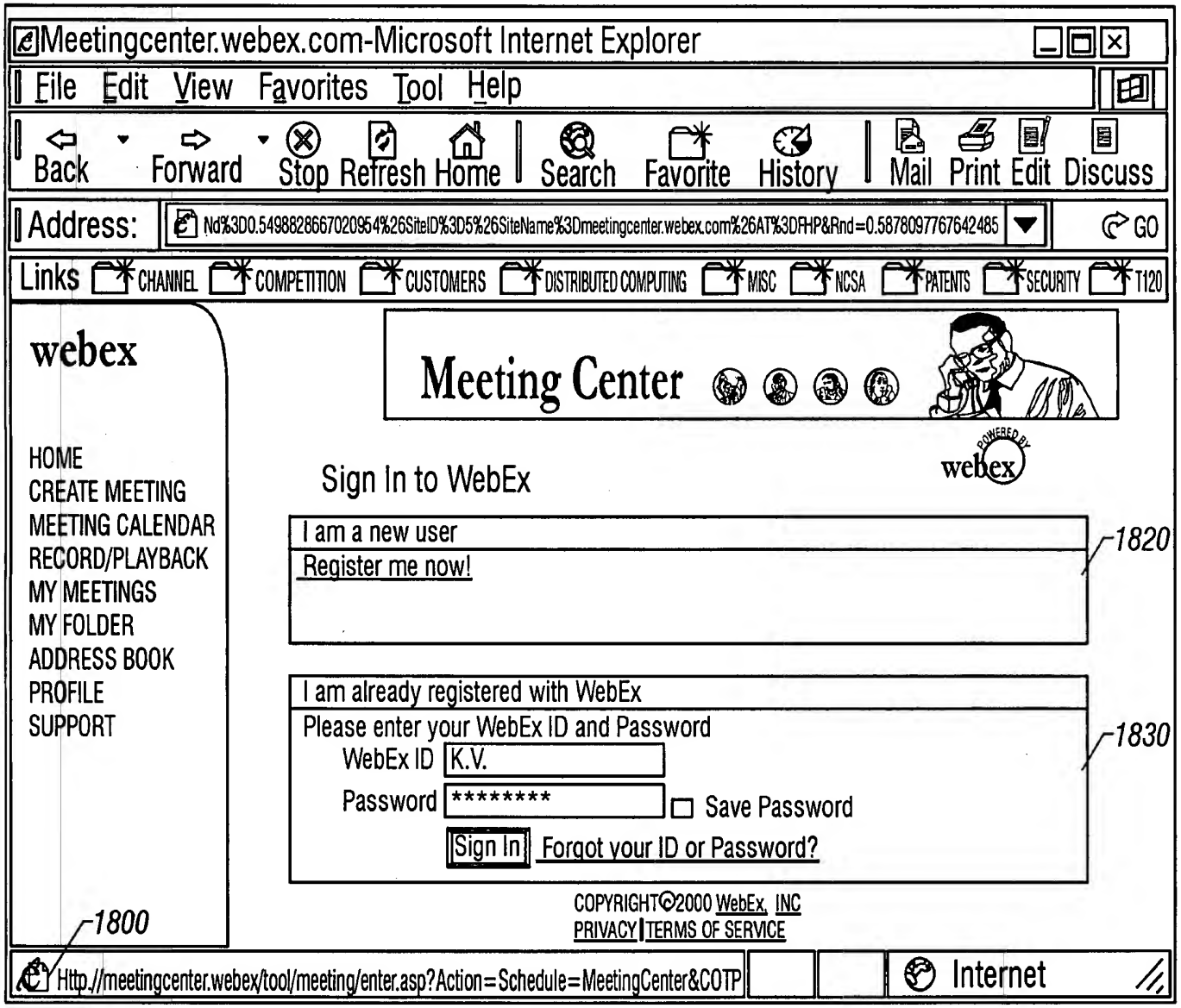


FIG. 18B

Title of Invention: Fault-Tolerant Server Architecture For Collaborative Computing
Attorney Docket No.: M-8858 US Inventors: Min Zhu,
Serial No. 09/752,376

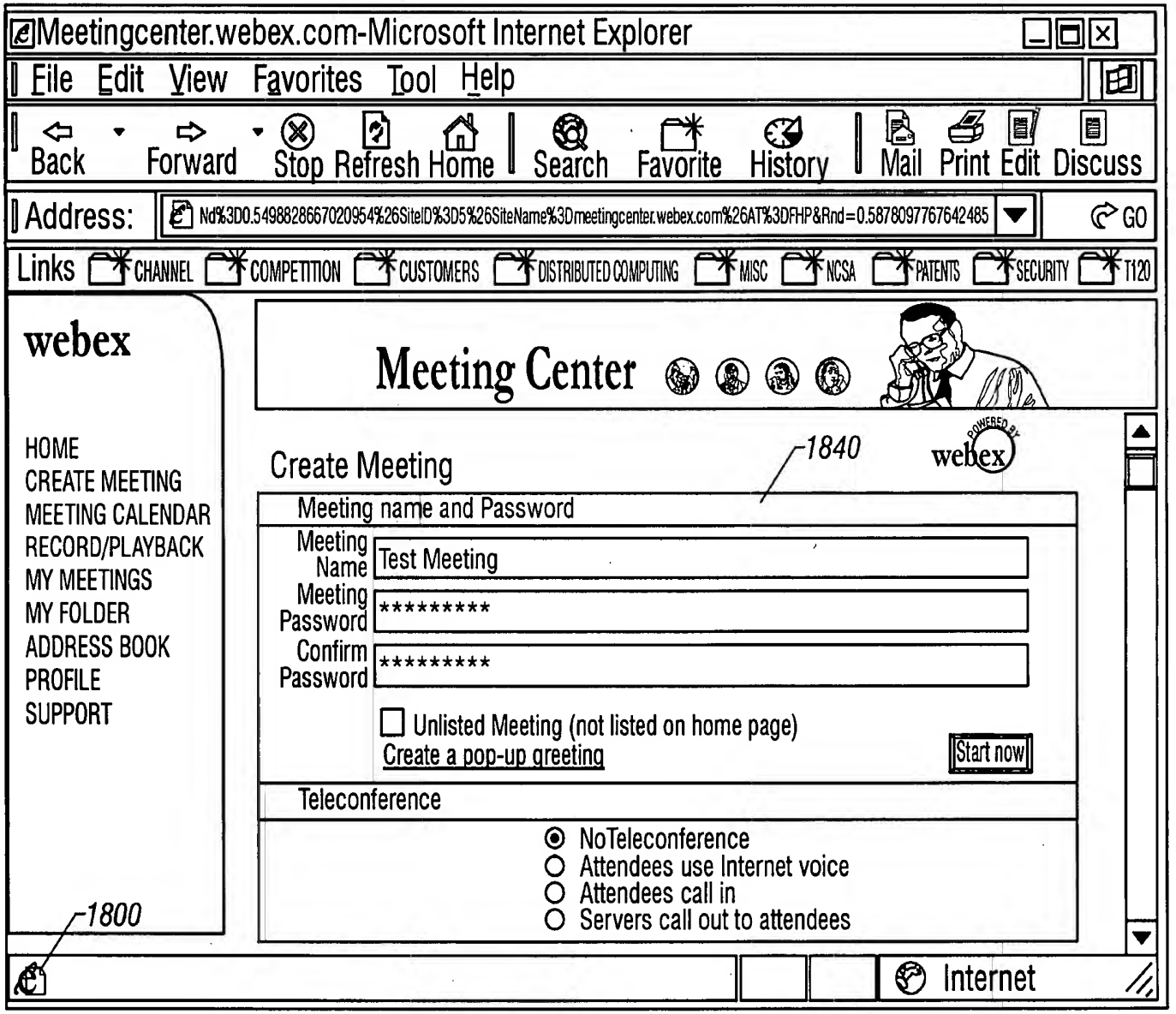


FIG. 18C1

Title of Invention: Fault-Tolerant Server Architecture For Collaborative Computing
Attorney Docket No.: M-8858 US Inventors: Min Zhu
Serial No. 09/752,376

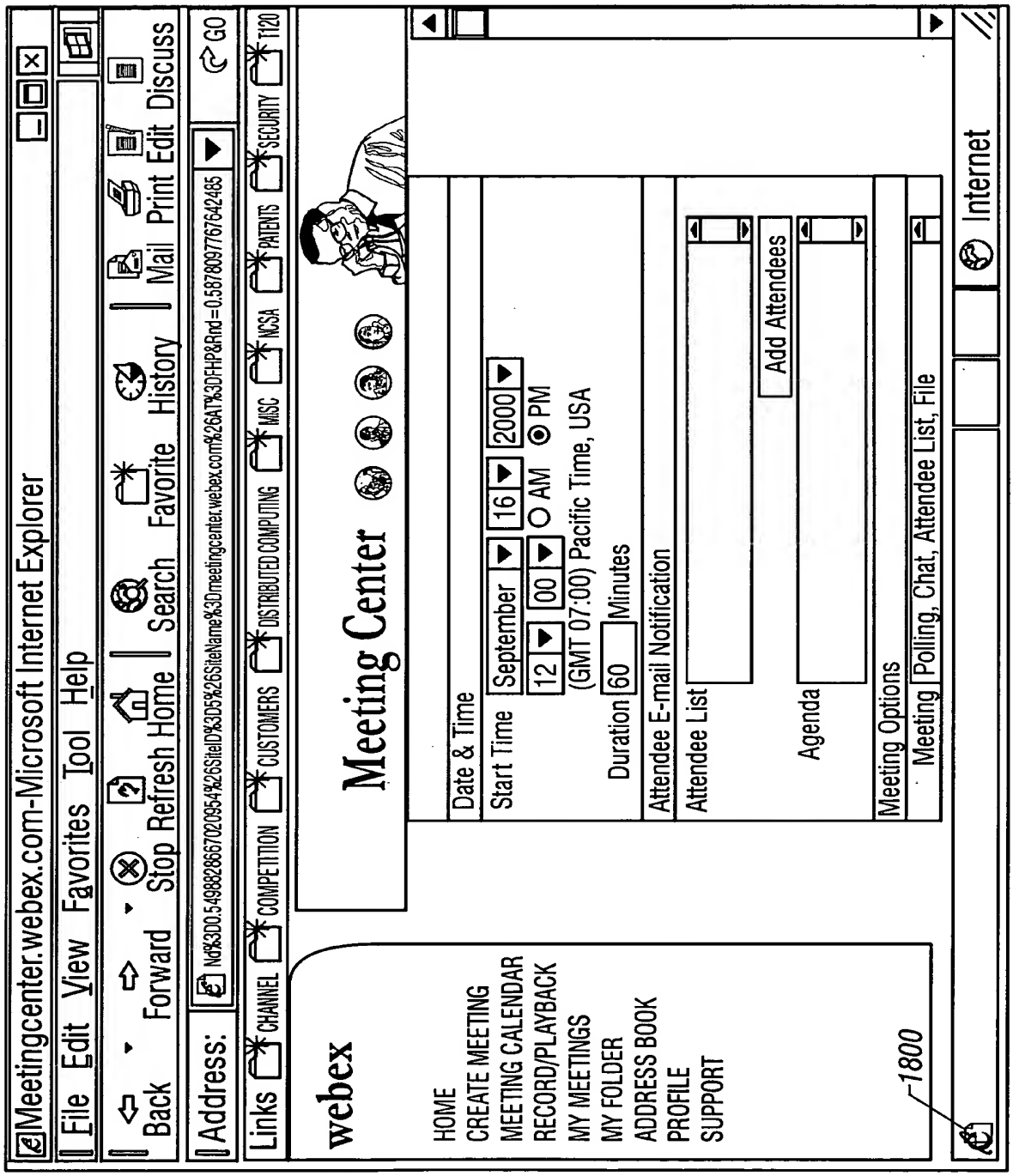

Meetingcenter.webex.com-Microsoft Internet Explorer
File Edit View Favorites Tool Help
Back Forward Stop Refresh Home Search Favorite History Mail Print Edit Discuss
Address:
GO
Links
CHANNEL
COMPETITION
CUSTOMERS
DISTRIBUTED COMPUTING
MISC
NCSA
PATENTS
SECURITY
T120
webex
HOME
CREATE MEETING
MEETING CALENDAR
RECORD/PLAYBACK
MY MEETINGS
MY FOLDER
ADDRESS BOOK
PROFILE
SUPPORT
1800
Meeting Center
Date & Time
Start Time
September
16
2000
12
00
AM
PM
(GMT 07:00) Pacific Time, USA
Duration
60
Minutes
Attendee E-mail Notification
Attendee List
Add Attendees
Agenda
Meeting Options
Meeting
Polling, Chat, Attendee List, File
Internet

FIG. 18C2

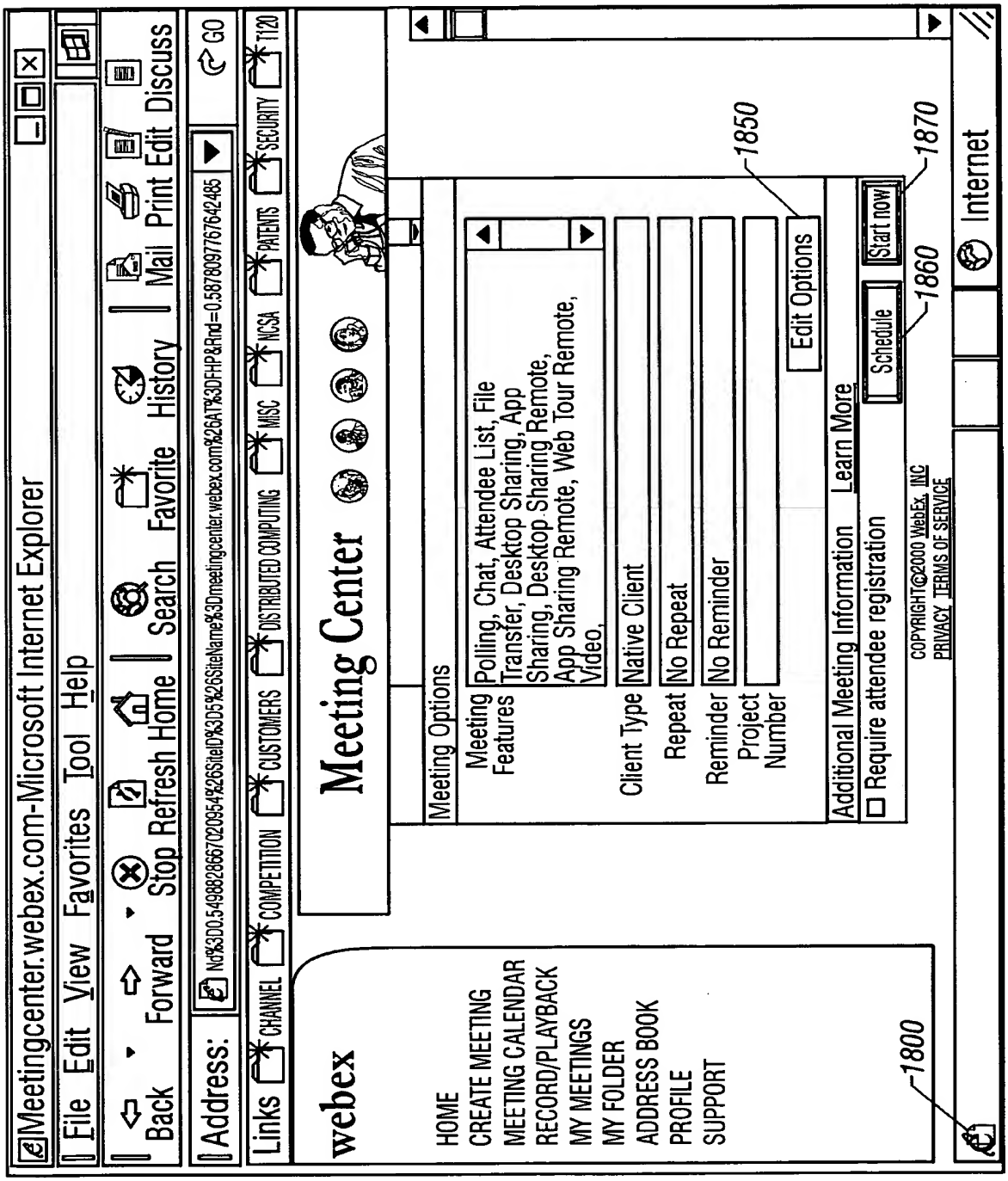

Meetingcenter.webex.com-Microsoft Internet Explorer
File Edit View Favorites Tool Help
Back Forward Stop Refresh Home Search Favorite History Mail Print Edit Discuss
Address:
Links CHANNEL COMPETITION CUSTOMERS DISTRIBUTED COMPUTING MISC NCSA PATENTS SECURITY T120
webex
HOME
CREATE MEETING
MEETING CALENDAR
RECORD/PLAYBACK
MY MEETINGS
MY FOLDER
ADDRESS BOOK
PROFILE
SUPPORT
1800
Meeting Center
Meeting Options
Meeting Features
Polling, Chat, Attendee List, File Transfer, Desktop Sharing, App Sharing, Desktop Sharing Remote, App Sharing Remote, Web Tour Remote, Video,
Client Type
Native Client
Repeat
No Repeat
Reminder
No Reminder
Project Number
Edit Options
1850
Additional Meeting Information
Learn More
Require attendee registration
Schedule
Start now
1860
1870
COPYRIGHT©2000 WebEx, INC
PRIVACY TERMS OF SERVICE
Internet

FIG. 18C3

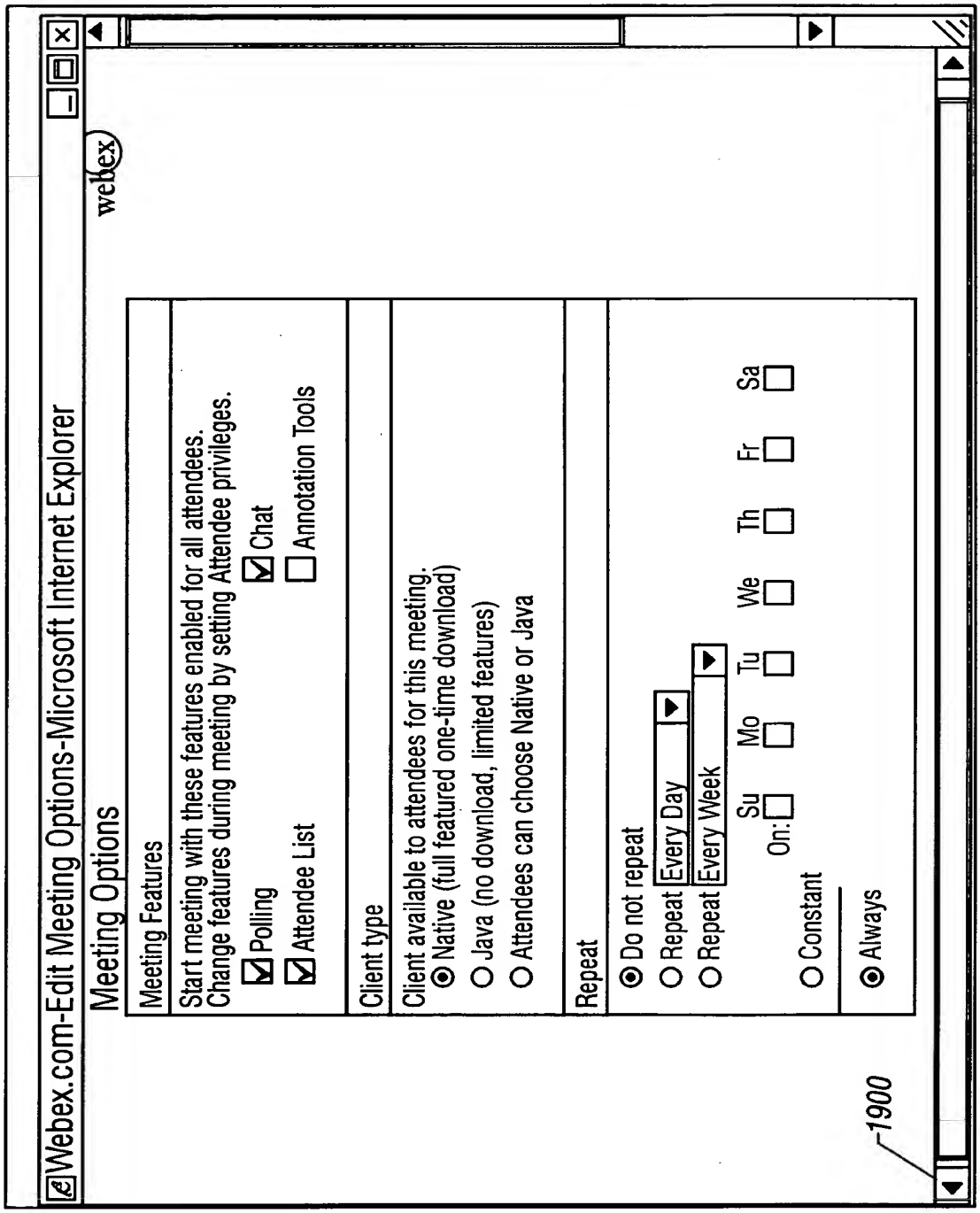

Webex.com-Edit Meeting Options-Microsoft Internet Explorer
webex
Meeting Options
Meeting Features
Start meeting with these features enabled for all attendees.
Change features during meeting by setting Attendee privileges.
Polling
Chat
Attendee List
Annotation Tools
Client type
Client available to attendees for this meeting.
Native (full featured one-time download)
Java (no download, limited features)
Attendees can choose Native or Java
Repeat
Do not repeat
Repeat Every Day
Repeat Every Week
Su Mo Tu We Th Fr Sa
On:
Constant
Always
1900

FIG. 19A

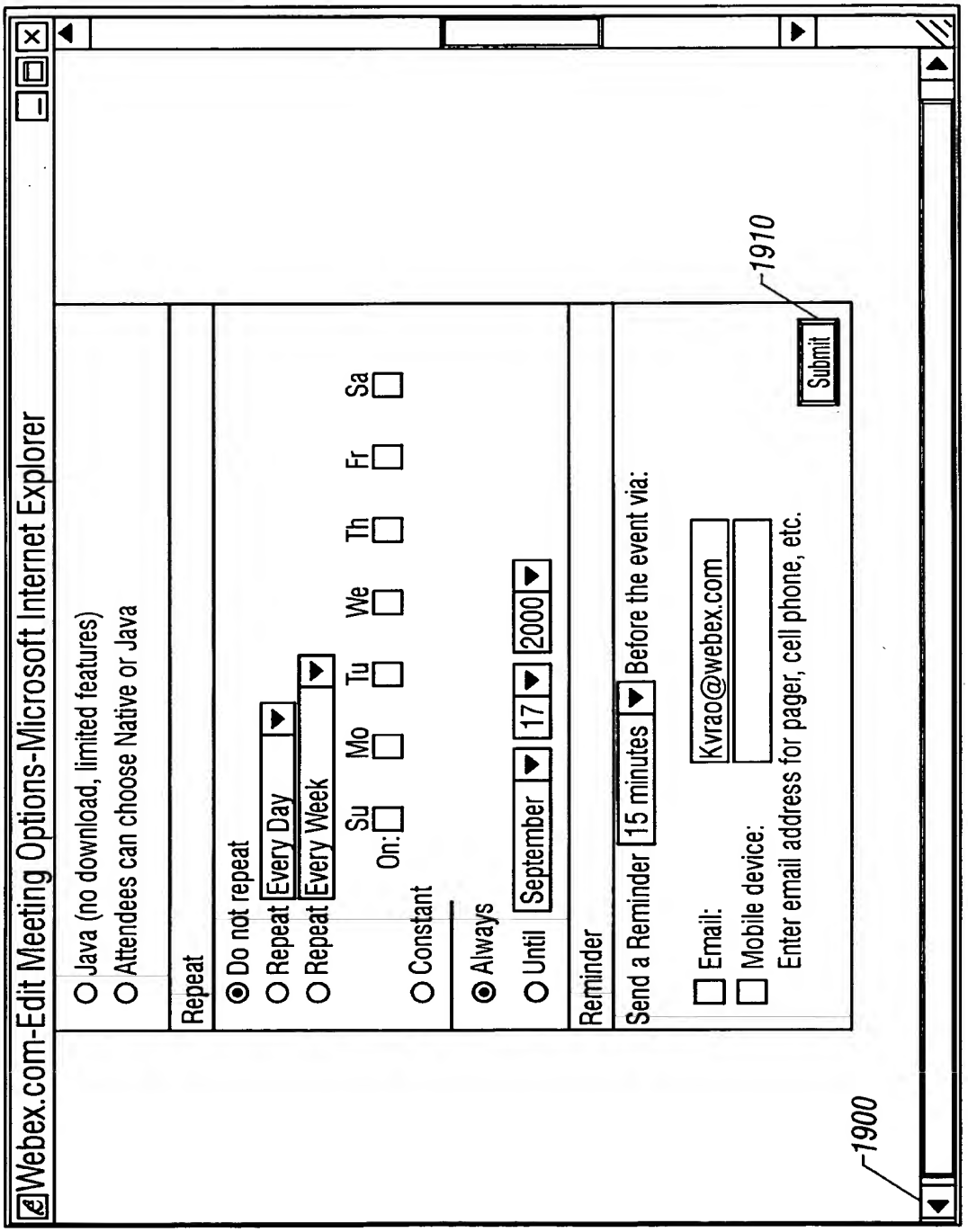

Webex.com-Edit Meeting Options-Microsoft Internet Explorer
Java (no download, limited features)
Attendees can choose Native or Java
Repeat
Do not repeat
Repeat Every Day
Repeat Every Week
Su Mo Tu We Th Fr Sa
On:
Constant
Always
Until September 17 2000
Reminder
Send a Reminder 15 minutes Before the event via:
Email: Kvrao@webex.com
Mobile device:
Enter email address for pager, cell phone, etc.
Submit
1900
1910

FIG. 19B

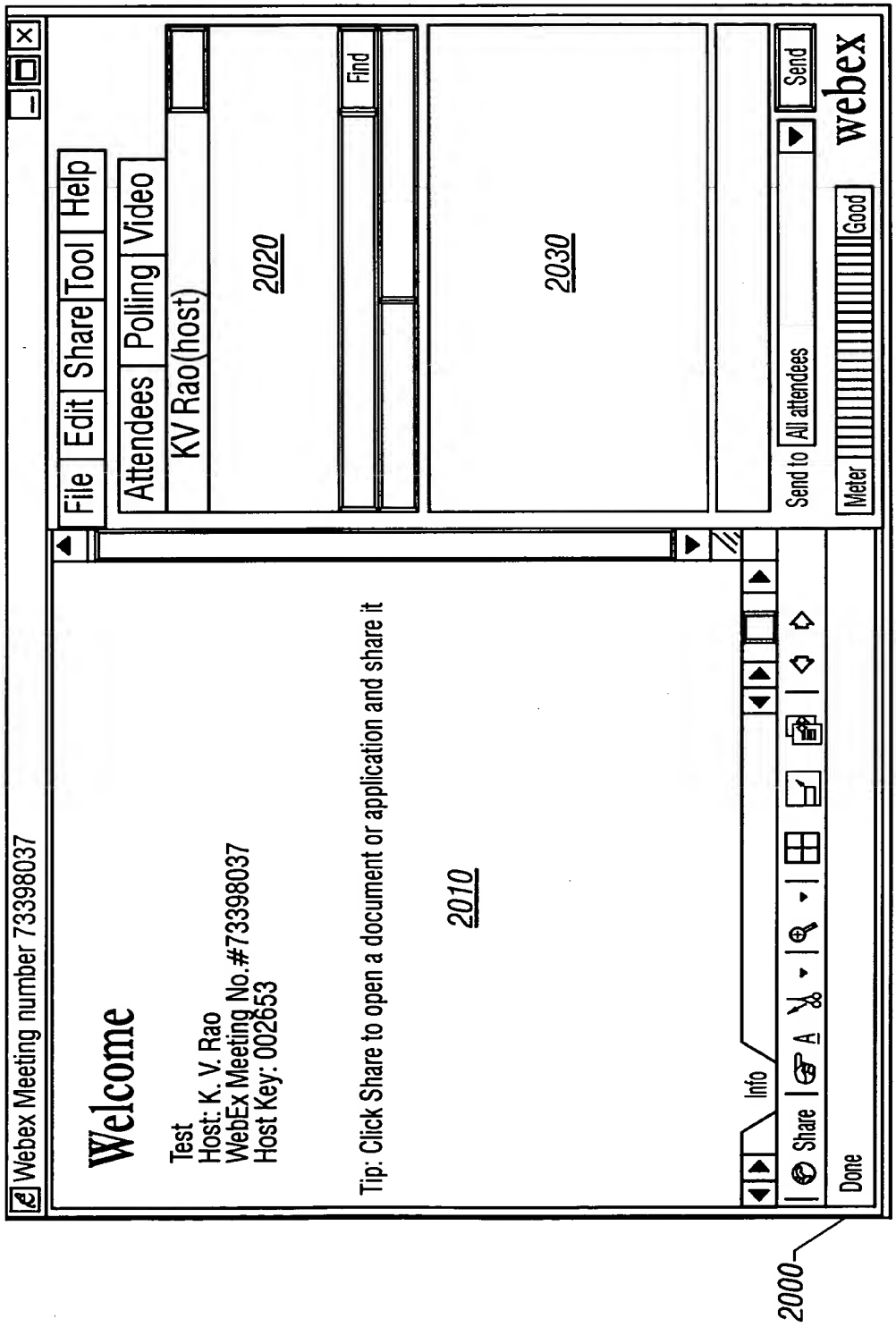

Webex Meeting number 73398037
File Edit Share Tool Help
Attendees Polling Video
KV Rao(host)
2020
Find
Welcome
Test
Host: K. V. Rao
WebEx Meeting No.#73398037
Host Key: 002653
Tip: Click Share to open a document or application and share it
2010
2030
Send to All attendees
Send
Meter Good
webex
Info
Share
Done
2000

FIG. 20A

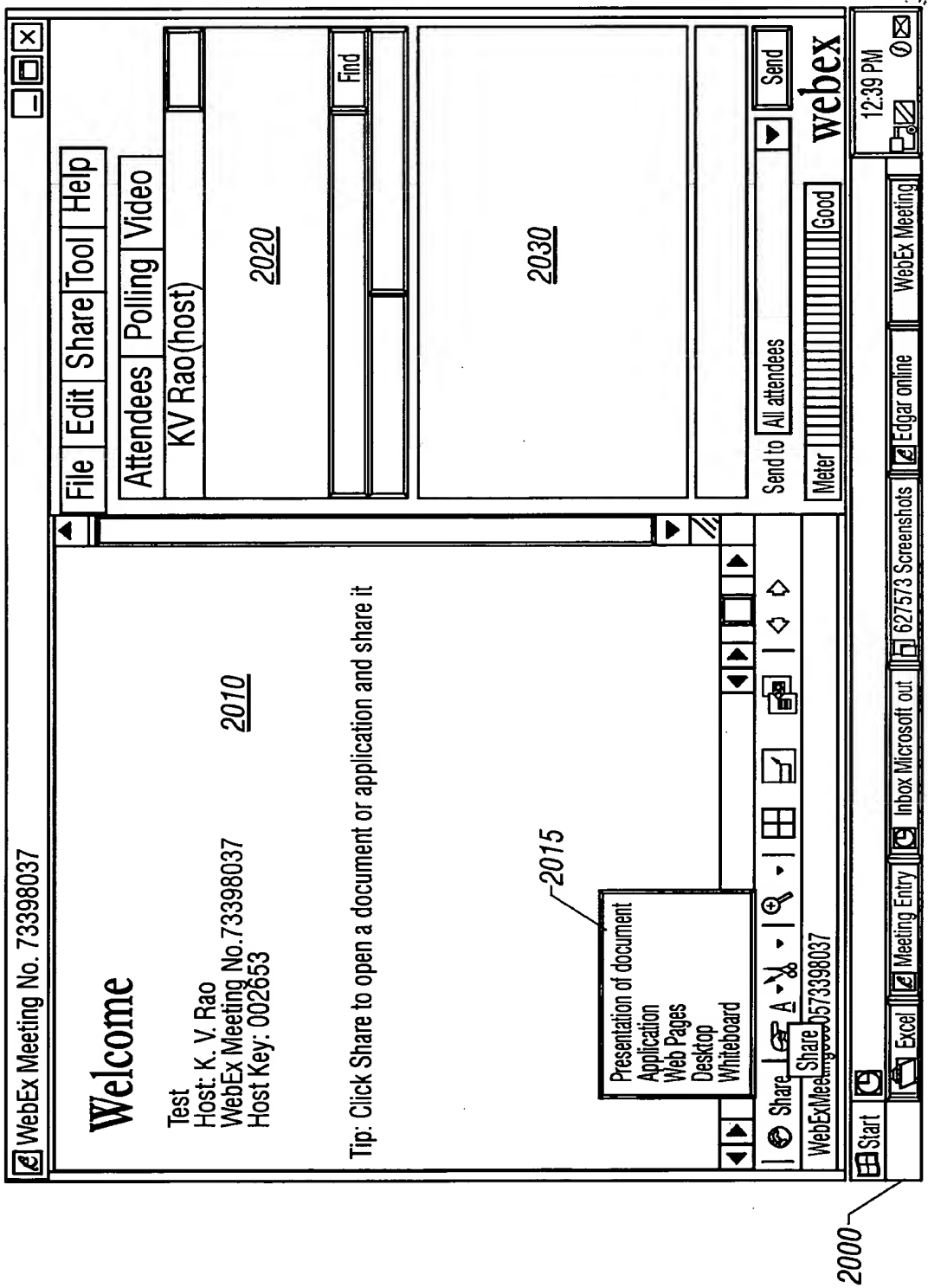

WebEx Meeting No. 73398037
File Edit Share Tool Help
Attendees Polling Video
KV Rao(host)
2020
Find
2030
Send
Send to All attendees
Meter Good
webex
Welcome
Test
Host: K. V. Rao
WebEx Meeting No.73398037
Host Key: 002653
2010
Tip: Click Share to open a document or application and share it
2015
Presentation of document
Application
Web Pages
Desktop
Whiteboard
Share
WebExMeeting0573398037
Start
Excel
Meeting Entry
Inbox Microsoft out
627573 Screenshots
Edgar online
WebEx Meeting
12:39 PM
2000

FIG. 20B

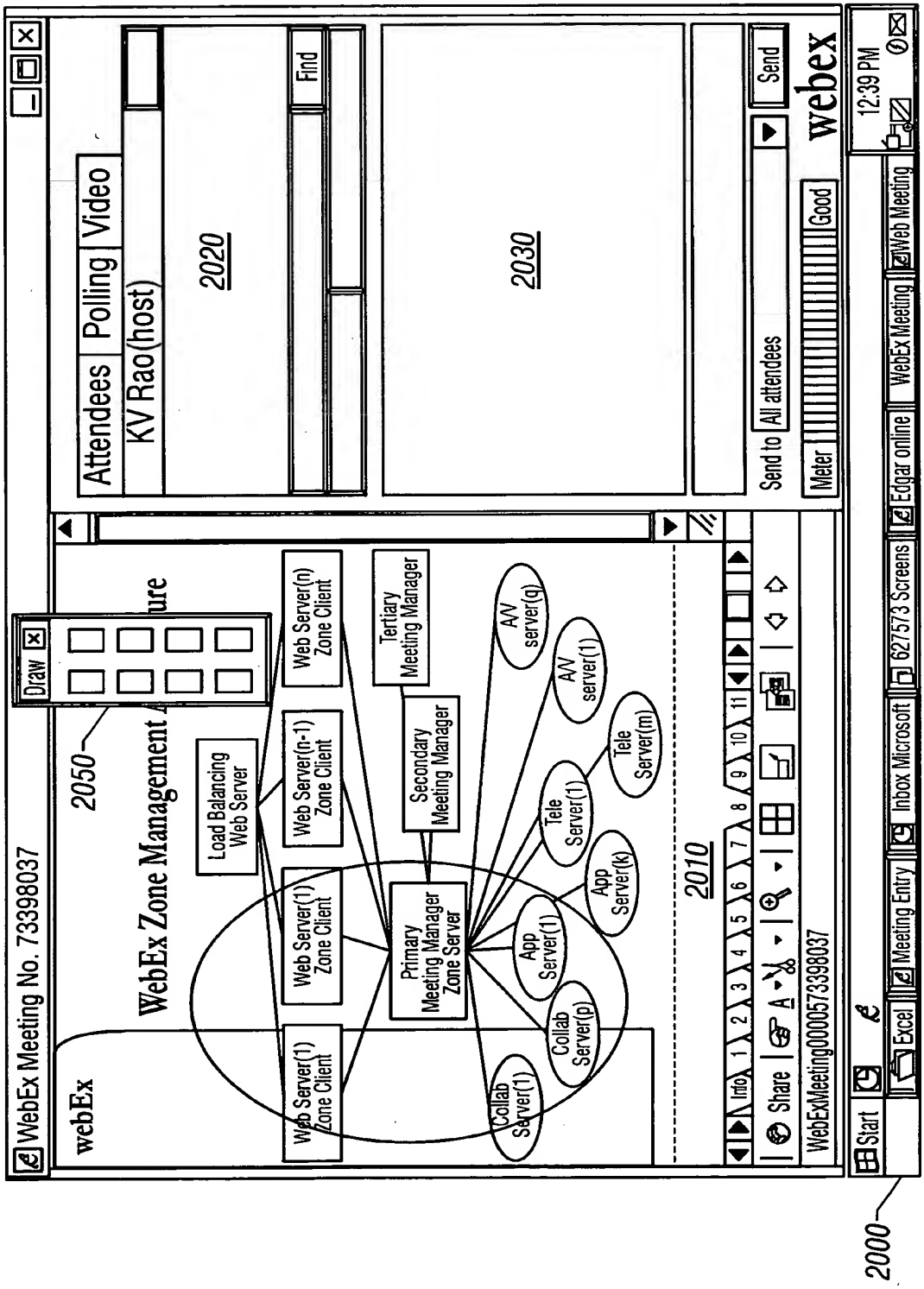

WebEx Meeting No. 73398037
webEx
WebEx Zone Management
2050
Load Balancing Web Server
Web Server(1) Zone Client
Web Server(n-1) Zone Client
Web Server(n) Zone Client
Primary Meeting Manager Zone Server
Secondary Meeting Manager
Tertiary Meeting Manager
Collab Server(1)
Collab Server(p)
App Server(1)
App Server(k)
Tele Server(1)
Tele Server(m)
A/V server(1)
A/V server(q)
2010
Draw
Attendees
Polling
Video
KV Rao(host)
2020
Find
2030
Send to
All attendees
Meter
Good
Send
webex
Info
Share
WebExMeeting0000573398037
Start
Excel
Meeting Entry
Inbox Microsoft
627573 Screens
Edgar online
WebEx Meeting
Web Meeting
12:39 PM
2000

FIG. 20C